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CONTENTS.

M.

N.

O.

P.

R.

T.

V.

W.

New-York Dental Recorder;

DEVOTED TO THE THEORY AND PRACTICE OF

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Vol. X.] JANUARY, 1856. [No. 1.

TRANSACTIONS OF THE PENNSYLVANIA ASSOCIATION OF DENTAL SURGEONS.

The Members of the Pennsylvania Association of Dental Surgeons have been earnestly discussing the question of amalgam, and a full account of their late proceedings is published in the January number of the News Letter. We notice that considerable stress is laid upon the fact, that, for the *new* material, *pure* metals are used, as though this requirement was peculiar to the new mercurial pet. This is by no means the case. Most of the prominent advocates for the use of amalgams have urged the importance of precaution in this respect. Another important point seems to be the removal of all discoloring matter by alcohol.—We were not aware before this, that all the oxides of mercury, tin and silver were soluble in alcohol, and though very much of coloring matter may be thus removed, the formation of others not thus extracted, will depend very much, we opine, upon the nature of the substances with which it may be brought in contact *when in the mouth*, and under these latter circumstances we have very strong doubts as to whether the most unlimited use of alcoholic liquors will restore the blackened member to its *truthful* color. There seems to be a very great difference of opinion among members of the association in regard to the virtues of the "alloy?" but we are pleased to note that the discussion has been, and we doubt not, will be conducted without dictatorial bigotry or personal abuse. Such, at least, will be the course pursued by the members as a society—as individuals we dare not hope so much; the man, who, *because he has not succeeded in using successfully a new material*, will state *privately*, that those who do use it are

dishonest, cannot be expected to pursue a different course with those who do not agree with him on the amalgam question.

We desire to call especial attention to the remarks made by the present champion of amalgam, from which we quote the following: "If, in what I have now to say to you, you deem me in error, do not hastily condemn the suggestions I make, *but let me ask you, each and all, to experiment in the article of amalgam, with an eye single and sincerely desirous of eliciting the truth, whatever that may be, careful in your experiments, and in all of your manipulations do not take anything upon trust for me, or use it blindly and indiscriminately because I do, but see for yourselves.*" Again, in another place, "*Don't take hold of it, pinning your faith upon my sleeve.*" When this gentleman's previous course (upon the same question) extending over a period of more than twenty years is taken into consideration, these remarks were certainly not uncalled for or inappropriate. And we can therefore consistently demand from the Dental Profession at large, the application of the same *important suggestions* to the following report on Crystal Gold, which that gentleman is the first to sign. Before giving the report, however, we will again quote for the benefit of those who use either amalgam or Crystal Gold, from an article by the same most reliable authority (News Letter, April, 1854). Speaking of Crystal Gold, the gentleman says: "I look upon the introduction of this article into use in the profession as an important era, *in the hope that it will entirely* take the place of *all* amalgams and succedaneums for filling teeth, substituting a *pure* for an *impure* article, for I am fully persuaded there are many gentlemen in the profession who have used amalgams with the honest belief that they could do more and better for their patient's good with it than with gold foil. If they can be persuaded to adopt it in lieu of the *baser* material, whether it ever supersedes the use of foil or not, the discoverers and manufacturers will be entitled to the thanks of the public and the profession."

Now then for the report, and fearing there may not be *enough of this intellectual feast* to "go round," we will furnish it in small slices, with comments:

[The Italics are our own.—Ed.]

"REPORT ON SPONGE GOLD.—TO THE PENNSYLVANIA SOCIETY OF DENTAL SURGEONS.

Gentlemen: Your committee, appointed to test the value of Sponge or Crystal Gold as a filling for carious teeth, would respectfully report, *That from all the knowledge they can gather from the experience of members of the Profession*, (italics are ours,) and also from the experience of members of the Committee, they do not consider it advisable to recommend it to the profession as a reliable or safe material for filling teeth."

The above, rendered literally, means that they have gathered no knowledge from the experience of those members of the profession who have, in the Dental Journals, advocated the use of Crystal Gold, or else they consider the authors of those articles unreliable. If the first is their position, they humiliate the society of which they are prominent members. If they assume the latter position, they simply insult those who have taken the pains to make known their own experience in order that the Dental Profession might avail itself of the advantages they knew could be realized by a proper and skillful use of Crystal Gold. Those who read the report must make up their minds as to which of these two positions the said committee will be considered to have occupied. But let us proceed:

"With *one* exception, your committee, is unanimous in their *determination never to use it in their practice.*"

We presume that this expression was considered by those who drew up the report as a "settler," and so it is; for it is proof positive that they *are not open to conviction*, and if they are not now, what reason have we for supposing that they ever were; at any rate, it shows the evident leaning of what proves to be so very one-sided a report. Again:

"One of the committee thinks he may use it in some cases where it would be used to fill out or patch a foil filling, and where it would not come in contact with the bony parieties of the cavity."

Who may this *one* be, who sticks up so nobly for his rights, defining them so explicitly? How we should like to take this man by the hand, and giving it a hearty shake, wish him a "Happy New Year," and many, very many, *more brilliant* returns of the same. How earnestly would we congratulate him upon his dis-

tinguished success in procuring and making known this important reservation "of the rights of man," and how sincerely we would press home upon him our conviction of its exceeding and peculiar value when taken in connection with its succeeding sentence, "no time, labor or expense is saved to the operator." Really, this ingeniously honest man should be better known — he certainly will prove an ornament to the profession, if not a useful member.

"The amount of pressure necessary to make an apparently good filling of Crystal Gold is greater than is needed for gold foil, and all, even its warmest friends, admit it takes more time."

This is a perversion, "its warmest friends" may have said that more time was required to make a *good* filling with it than when foil was used, but they never could have said that this was the case where mere "apparently" good fillings were made. However, let this pass. We wish to call attention more particularly to the new "dodge" contained in the first clause of the sentence, "the *amount* of pressure necessary, &c." For the benefit of those who may have the fear of a dynamometer before their eyes, we would suggest that the *amount* of pressure necessary to make a filling with any kind of gold, is a question of but childish import where frail teeth are concerned, compared with the very important one of how much pressure must be applied at one time, in what direction this pressure is to be applied, and with what results. These are the questions an earnest and active truth-seeking committee would have attempted to solve. Have they done so? We cannot see from their report that they have even attempted to do anything in this direction. But to return to this question of pressure: let us suppose a case where the walls of the cavity are so slight that a pressure of ten pounds applied laterally will split the tooth. Will twenty pounds of pressure applied perpendicularly or in a direction with the length of the tooth necessarily break it? certainly not; and we might in using Crystal Gold apply that extent of pressure upon the piece first introduced, thus making it solid, and the same pressure may be made upon the next piece with the same result, and this process may be continued twenty times, or even until the *amount* of the pressure exceeds five thousand pounds, without endangering the tooth.— Where foil is used, the greatest amount of pressure is applied af-

ter the gold is introduced, and in order that a good foil filling be made, *greater pressure at one time* is in every case necessary than if Crystal Gold were used, and in the case of foil as generally used, the *lateral* pressure is of course increased. The question then would be, if a tooth will bear only ten pounds of pressure at one time against its side, are we not more likely to break it by applying fifteen pounds at one time in that very direction, than by applying five pounds at a time for twenty times in a direction with its length? Who would hesitate to answer this question at once in favor of the latter being the safest procedure, and yet in the successful operation the *amount* of pressure will be one hundred pounds, and the former only fifteen. This question of amount of pressure is a very interesting one, and by the use of Dr. White's Dynamometer, may be made a very instructive one, but to a person who is not likely to make the distinction between the amount of pressure applied at one time, and the gross amount required to perfect a filling, it will doubtless prove a very deceptive one. Now again for our "intellectual feast:"

"If a more perfect and enduring filling was made by this extra time and labor, your committee would deem it time well spent, but this has not proved to be the case. The fillings placed by your committee, have, in nearly every case, been removed and the teeth re-filled, in consequence of the imperfect condition in which they were found after a lapse of only a few months.—The edges of the fillings crumbled and admitted moisture freely around them; in others, the teeth were very much discolored under and around the fillings, the discoloration being so great as to demand the removal of the fillings."

To this we reply, that where "the edges of the fillings crumbled and admitted moisture freely around them," the fillings were not properly condensed—an unpleasant acknowledgment for them to make—and so they did not make it. It is still more unpleasant for us to made the assertion, but we are ready at any time to sacrifice our personal feelings to professional duty. One perfect filling of Crystal Gold will out-live a thousand sneers based upon operations that failed "*after the lapse of only a few months.*" We have seen failures with Crystal Gold; we occasionally meet with precisely such cases as those described, but our failures with Crys-

tal Gold are fewer than our failures with foil. Every body that uses foil *occasionally* fails, some fail as often, we are told, as *semi-occasionally*. But that is no argument against foil or Crystal Gold either. We are almost daily seeing fillings of Crystal Gold that have been worn from three months to nearly three years, which are, particularly the older ones, superior to any gold foil fillings of similar shape, size and age, that we have ever met with. Failures are mortifying, but they occur to every one. A man's success in anything depends upon the relative bearing that his failures and successes have towards the sum total of his operations, and he must judge for himself. If he cannot use one article as well as another, he must choose the one he can do the most good with; but because others choose the article he rejects, and do succeed with it, has he a right to sneer or condemn, or to say that such a person, because he uses such a material, is dishonest? and yet such a remark was made by a member of that committee, showing conclusively, we think, that there was one of them at least, so blinded by prejudice as to be disqualified for the position. But to proceed:

"In others the teeth were very much discolored around and under the fillings, the discoloration being so great as to demand the removal of the filling."

In these cases the gold was undoubtedly impure. Pure gold will not produce such results, and impure gold will, whether in foil or crystals. During the past year we have removed upwards of thirty foil fillings for precisely the same reason; the operations were good, but the foil had turned black and discolored the teeth. The parties who put in these fillings never would have used impure foil had they have known it; at least we are compelled to believe this, both from their reputation and the time evidently bestowed upon the operations. We have also seen teeth stained from Crystal Gold fillings, and from the same cause—*i. e.*, impurity. Crystal Gold can be made pure; the analysis published two years ago by Dr. Townsend, proves it to be purer than "most foil." Gold foil is sometimes impure. The experience of almost every Dentist in the land proves this, and the cause is the same; it is due to the ignorance, stupidity, carelessness or cupidity of the manufacturers, or to the accidental and unforseen circumstances that may have occurred while the gold was passing through some

of its refining or manufacturing processes. Whatever may be the cause, the manufacturers must always be censured by the Dentist or patient who is thus victimized. We make no excuse for them, nor are we fighting their battles; we are acting on our own defence, and not theirs, and we cannot see why it is that where the two preparations of gold are liable to the same defects and from precisely the same causes, that the defects of the one should cause its virtues to be ignored and its advocates sneered at, while the adoption of the other is to be considered as the "ne plus ultra" of professional ambition.

"Your committee have the report of some gentlemen who seem to have succeeded in making very perfect fillings, which so far stand the test of time and wear of the very material which the manufacturers admit to be a *bad* article, and which they wish returned to them, that they may furnish a better in its stead."

Whether this is intended as a sneer at the gentlemen aforesaid or at the manufacturers, we are unable to say. But the remark is ungenerous, and under the circumstances, unjust. The admissions of the manufacturers were published in the November number of the Recorder, and re-appeared in the January number of the News Letter, which also contains this report; and neither the committee nor any one else can say that they admit their former preparations to be *bad*, but that they were inferior to the new preparation which is undoubtedly more desirable, and hence they are anxious to substitute it for the former. They do admit that occasionally and accidentally gold was sent out that was not pure, but no one contends that fillings made of the impure specimens stood the test, nor do the members of the committee allude to the impure gold when they make the remark, for they at once proceed to say that "the only difference between that furnished two years ago and the present preparations, seems to be a property of greater adhesion." They do not even state *which of the preparations* possess the greatest adhesive properties, showing conclusively that they have been only careful to condemn, and have been exceedingly careless when examining into facts or culpably so in preparing their report.

"In all other respects it is open to the same objections as the earlier specimens. With these views, your committee cannot recommend the present preparations of Sponge or Crystal Gold

for filling teeth, if the object aimed at be their preservation for a series of years. All of which is respectfully submitted."

E. Townsend, F. Reinstein,
J. D. White, Chas. A. DuBouchet,
J. F. B. Flagg, Jas. M. Harris,
T. L. Buckingham, Dan'l Neall.
J. H. M'Quillen,

It has never been our ill-fortune to have met with such a paper as the above before. We consider it unjust and one-sided, and although the names and reputations of its signers may stand high, their report never can. It bears a tone of prejudice throughout —it is wanting in candor, does not support its statements by facts, and gives such coloring to isolated facts or accidental cases as to give them pre-eminence in condemning, while nothing is said in behalf of the material, and all facts and arguments in its favor are passed unnoticed.

Nothing whatever is said relative to the different varieties of Crystal Gold, nor would any one suppose from the report, that the committee had ever seen or heard of more than the formations sold by A. J. Watts & Co., and yet other manufacturers have sold Crystal Gold that can be said to bear scarcely a resemblance to those of Watts & Co., and which are as different in working properties as they are in structure and appearance. The absence of all allusion to these varieties of Crystal or Sponge Gold offers important presumptive evidence that the committee either made a very superficial investigation of the subject in question, or that they have omitted to report on very important points connected with it which they must otherwise have known.

The report has not even the merit of brevity, for the whole might be better expressed in four words—Never use Crystal Gold. That one sentence would have conveyed the one great idea of which they were anxious to deliver themselves. Strange to say, the Society received and *adopted* the report, thus placing itself in precisely the same situation relative to a preparation of *pure gold* that the American Society was placed in relative to amalgam. The adoption of this report makes its sentiments a part of the code of the Society, and those of its members who

may wish to continue as such, must abandon their Crystal Gold or their self-respect.

Thus ends this chapter on Crystal Gold. Will the Society treat with equal severity *those of its members who may not* wish to introduce the use of the new amalgam in their practice? After this, they can impale or exclude any such "impracticables" without stretching their principles, or travelling far for a precedent.

AMALGAM FOR PLUGGING TEETH.

BY. J. D. WHITE.

We remarked, in a series of papers on plugging teeth, published in the Dental News Letter some years ago, that we did not intend to enter the field of discussion on the merits of this substance for plugging teeth, nor do we now intend to do so; but, lest our silence on the subject, now that it is again being employed by a great number in the profession, might be construed into favoring its use, we have a few words to say, that our professional brethren may know where we stand; and more especially as we have been called upon by our distinguished friend, Prof. Townsend, "to come up to the mark with as little reserve as he, and back square out of a mistake which he has been publicly pledged for." We should not have kept some of the profession ignorant of our views up to this time, had it not been for want of room in our last journal. This will doubtless be a sufficient answer to those who have inquired of us why we did not give our views on the subject at that time, and who have sent to us to know what we thought of it before they would consent to use it. We confess we know nothing about the new amalgam, as it is called, nor do its advocates, except that it is prepared with more care than the old, and will not discolor as rapidly in the mouth. The time has been too short since this new preparation has been used to say much for it, (since September, 1854,) but as cases of the old have been cited that have lasted for twenty years, to prove its great and heretofore unappreciated value, we should infer that there is nothing better claimed for it. It is difficult for us to see

how it is to be of great, or any value to the profession, when we are told that "there is no time saved to the dentist," and "requires as nice skill in the preparation of the cavity, as great care in the preparation of the material, and as much dexterity of manipulation in using it as are required in the employment of gold for the purpose." What does all this mean? *has a Daniel come to judgment?*

Considerable discussion has already taken place before the Pennsylvania Society of Dentists on the subject, but about which we have nothing to say, as it explains itself. It is remarkable what an effulgent light has recently burst in upon the minds of some of our distinguished members of the profession. Keep cool, take a little more time, and remember the fate of a former improvement of the same preparation, with *cadmium*. We have had a few opportunities already to witness dissatisfaction where the new amalgam was used, and of the old we have seen cases too numerous to mention. We will take time here to give a few cases which may throw some new light on this subject, and which have doubtless escaped observation on the part of the advocates of the new preparation, as well as the heretofore long undiscovered merits of the old. An intelligent lady, Mrs. M., applied to us about five years ago to have some operations upon her teeth. She wore a partial upper set of teeth, placed in over the roots, as it was deemed by her dentist an injury to the natural expression of the mouth to extract roots for the preparation of it for setting artificial teeth. It was contended by her operator that the scientific dentist did not mutilate the mouth to restore lost teeth, that the roots were plugged with amalgam, and thus preserved for life. This gentleman founded the superiority of his judgment and practice upon the fact that he was a medically educated dentist. Yet we are told that we must not take the occasional use of this material by the educated portion of the profession as a license for its indiscriminate use by the quack. This lady's health declined; she became old in appearance much more rapidly than is usual at her age — then about thirty. She was constantly troubled with the sick head ache — not an uncommon thing, however, with many persons. She suffered from neuralgia and numerous ailments; her health was at all times unaccountably affected; she became emaciated and lost her natural color; her

face presented a peculiarly pale blue cast, the cause of which was not suspected. We observed that the gums presented an extremely blue and spongy appearance, and which extended to the lips and diffused itself over the whole face. Every root was filled with the amalgam, as well as some remaining teeth. We advised the extraction of the roots, as well as the removal of all amalgam from the teeth. After some delay, this course was agreed to. The mouth, in a short time, resumed a healthful appearance; the gums became of a natural redness; the lips regained their former vermillion, and her cheeks their flush; in short, her health was restored. The close connection between these circumstances forced every one acquainted with the case, to the conclusion that this great revulsion in her health was due to the amalgam.

A gentleman, from the same operator, had a number of large fillings in his teeth, in cavities which were too large to be filled with gold. He applied to us for other operations. We observed the same blueness in his gums as that referred to above, and extending to the lips and face, as if the patient was affected with partial asphyxia. We advised the removal of the amalgam, which was agreed to, and the teeth were filled with gold. In less than one year, without any undue attention to the mouth, the gums lost their blueness and sponginess, and the patient remarked to us a short time since, that he had not enjoyed such good health for many years, nor had his mouth been so well.—His face is fresher in color, and he attributes the change in his health to the change in the material used for plugging his teeth.

We will give another case presenting a different aspect. A lady, about thirty years of age, of nervous sanguine temperament, (the two cases cited above were patients of the bilious sanguine); she had one large plug only, placed in a buccal cavity of the first inferior molar. In the course of a few months the whole of that side of her face became affected by an eruption or *eczema.* She applied to her medical adviser for relief, who regarded it as a simple eczema, as she did not suspect the cause of it, and was treated for some time without any marked benefit. At length her medical adviser regarded it as due to some specific exciting cause; examined her mouth, and at once determined it to be *eczema mercuriale.* The brother of the lady applied to us to re-

ceive her as a patient, which we did. The amalgam was removed, and in about one year the affection disappeared, but not without a great deal of treatment.

These cases cited occurred to patients among and belonging to large connections of education and in the higher walks of life, and among them the use of mercury as a component part of a material for plugging teeth, has received a severe reprehension.—*Dental News Letter.*

LOCAL ANÆSTHESIA BY CONGELATION IN DENTAL SURGERY.

BY J. RICHARD QUINTON, LONDON.

[CONTINUED FROM PAGE 271—VOL. 9.]

Such, in brief outline, is the history of the introduction of anæsthesia by cold in dental surgery. What says experience? I could fill a volume with testimonials, both from professional men and private patients, which have been forwarded me during the past twelve months, under the feelings of spontaniety, aroused by relievance from one of the dreaded tortures of our common lot. I will adduce only a few.

The following letter handed me by a patient, I adduce, because of its conclusive evidence of the value of this method. The writer of it had two large molar stumps extracted, one under the influence of congelation, the other *without* any benumbing application; with what results, let the letter testify.

"I cannot withhold giving expression to my experience of the great boon conferred on society by your excellent method of extracting teeth without pain. Having been a great sufferer for a long period from two firm and large stumps, the extraction of which I had for many months deferred from the dread of the operation, I hailed the announcement of your method with much joy, and at once resolved to place my case in your hands. I did so: not, however, without some secret misgivings; for I was well aware that my teeth would have to be punched out, and I confess to a participation in the general horror of that necessary method of operating. I am only too glad to be able to testify, that under your new method, that horror is done away with. My

two stumps, you will remember, had to be taken out separately. To the first you applied your method of congelation, and *with such success that I only knew it had been extracted from the fact of seeing it out of my mouth.* I had fully expected that the application of the cold itself would have been as painful as the extraction; but the congelation was evidently so gradually effected, that beyond a trivial sensation of cold I felt nothing. A sadder experience, however, awaited me. An accident happening to your apparatus, you prevailed upon me to submit to the extraction of the remaining stump without its being previously put under the influence of congelation, and the pain attendant upon that operation (though apparently less difficult to extract than the other) I shall not soon forget. At one and the same sitting, I thus had the double experience of what tooth extraction is under your process, and what it is in the ordinary way. Under such peculiar circumstances, I at least, can have no doubt, nor can I be under any delusion respecting the efficacy of your method. I have abundant reason to extol this new and excellent discovery. It cannot be too widely made known for the benefit of mankind; more especially as there was no alternative for me than to endure the pain or take chloroform; but my dread of chloroform nothing could overcome. I dare not inhale it under any circumstances, much less to destroy the brief pain, torturing though it be, of having a tooth extracted; I could not risk my life upon such an unequal balance. And I am satisfied that I am but one of a large class (of timidities, perhaps you will call us) who entertain the same fears of any agent, which, to destroy pain, must destroy consciousness, and who, I am sure, will hail this discovery with delight."

In the following case, the patient on *three* separate occasions submitted to the production of local insensibility by congelation, losing in all *ten teeth* without pain.

"I cannot resist thanking you for relief from, to my mind, one of the horrors of life, so almost universally experienced, viz: from the pain of tooth extraction. No one can, I think, have put your valuable process to the test more than I have done, and no one can be more delighted with the results, which have been satisfactory beyond my highest expectations. When I first visited you (which I confess to have done with little hope of such good re-

sults,) there were removed four stumps of considerable size and firmness, and one large back tooth, and I can truly say that, *the only sensation I felt, was like that of drawing a finger from a well fitting glove.* Encouraged and rendered fearless by this success, I placed myself a second time in your hands, on which occasion a large stump and another large tooth were extracted with equal freedom from pain. On a third visit, three other large stumps were taken out, and without any suffering whatever. Altogether, I have had ten teeth extracted under your process, and with such abolition of pain as to do away with that dreadful nervousness so natural when compelled to submit to such operations. Your method of applying the cold is to me as surprising as its beneficent effect of annulling pain ; for the entire process was to me wholly free from suffering, though I believe you informed me when applying it, that the degree of cold applied was as low as zero, yet I could not perceive it. But little bleeding followed, and the open spaces healed up beautifully. Success must attend such a valuable method of destroying pain. Its benefits only require to be known, to be valued by all who, like myself, turn shy at pain."

The ensuing letter testifies to two very important features, which I have repeatedly witnessed in my practice, viz : first, that the anæsthetic application of cold is highly serviceable in dispersing *tooth-ache.* I frequently apply it for this alone, and with considerable success. An aching tooth is set at rest, as I can personally testify, for months, and it may be for years. Secondly, it is the invariable experience of my patients that they are relieved from those feelings of exhaustion and nervous disturbance, which so ordinarily follow tooth extraction.

" Suffering greatly from tooth-ache, it was with a mingling of hope and fear that I resolved upon trying your method of painless extraction, which I had heard so much extolled. My enemy was a bicuspid tooth. Your method of freezing was applied for the space of two or three minutes, and so effectually was the insensibility produced, that *I was totally unconscious that my tooth had been withdrawn until you showed it to me.* I could not have credited that such perfect unconsciousness of the detachment of a tooth was possible, except under the sleep of chloroform.— One effect of the cold was peculiar, and worthy, I think, of remark.

I entered your consultation room with my tooth aching dreadfully; but, as the power of the cold applied was increased, my tooth-ache gradually diminished till it wholly disappeared. This soothing effect, apart from everything else, was delightful. But the grand thing of all is, that the *horrid wrench of tooth-drawing is by your method perfectly abrogated.* Being anxious that you should fill up with artificial teeth those spaces in my mouth, (which were so many evidences of what I had previously suffered in the hands of the dentist,) it was found necessary to remove a large lower molar. This was done in the same manner and with the same happy results. Nor should I have hesitated to have had any number of teeth out that may have been requisite, under such a pain-annihilating process. I am satisfied that in the exercise of such a valuable and beneficient work, you will obtain the enviable position of a dentist unfeared by his patients. Another advantage of your method, which was so grateful to me, was the entire freedom from that nervous exhaustion which had been a source of such misery and suffering to me after all my other extractions. I do not attempt to explain it — it may be from the absence of the pain, and of the ordinary nervous shock; but I know that I left your house with a degree of comfort which I never before experienced when having my teeth taken out.— Usually I have hastened home and sought repose; but after having visited you, I was able to pursue, without discomfort, my ordinary avocation."

The following letter I bring forward because it proceeds from the pen of a member of the medical profession, who, like many others, was very skeptical upon the subject.

"I place the following account of my tooth and its extraction at your disposal, and should the perusal of this letter inspire with confidence any one disposed to doubt the efficacy of cold, as an anæsthetic in tooth-drawing, the very earnest wish and object of its writer will be accomplished. I purposely abstain *in toto* from anything like persuasive argument, however, on the subject; I merely wish to place before you and all others whom it may concern, the plain and brief facts of my case, which are as follows:

"Two years ago, being tormented with violent tooth-ache in the first molar of the left side, which was in a very carious state, I applied to a surgeon for relief. He applied the key in the

usual way to the tooth, but so firmly was it fixed in the alveolus, that it could not be moved with any force that could be safely used. This failing, the forceps were tried, and during this attempt the tooth broke, leaving the two fangs still firmly fixed; the operator was utterly unable to move them, and so they were left in the jaw. These fangs gave no pain till a few months back, when by their irritation they caused frequent abscesses in the gum, attended often with a degree of pain, and always with awkward swelling. In consequence of this I applied to you for relief, and you promised me relief—and painless relief, too. On this latter point, I confess, I was quite skeptical; but with how little reason will appear in the sequel. The stumps were examined, and it was very evident that they were very tight—in fact, a very difficult case of stump extraction; and I myself knowing what tooth extraction was, from previous experience, could not but anticipate some pretty severe pain. Cold was applied, gradually, until the gum was rendered bloodless and benumbed, *and this process caused not the least pain.* As soon as this state of gum was thus attained, the forceps were introduced, and one stump grasped and extracted with most admirable skill. I felt no pain worth thinking of; *and certainly could not have believed the stump to be out, until I saw it in the teeth of the forceps.* When examined, it was found curved somewhat at its root, and dilated so as to get a very firm hold of the alveolus; this rendered its extraction longer than it would otherwise have been; and I cannot but think, for my part, that, had a very rapid extraction been attempted, the stump would most infallibly have broken short. The necessarily protracted nature of this extraction sufficiently accounts for the very slight pain felt towards the close. When bleeding had stopped, the cold was applied to the second stump, and though this was broken right down into the gum, and all but, if not quite, out of the operator's sight, yet still the forceps seized it at once, and without a single slip brought it clean out, *without any pain whatever.* The cavity left, I may say, *healed up with the greatest rapidity, in a perfectly healthy way.*

"Such, then, sir, are the facts of the case, and I feel much pleasure in writing them out; indeed, I do feel it quite a duty to make them as public as I can, for the sake of individuals who

have to undergo the notoriously painful operation of tooth drawing."

To these I may add my own personal experience. Being desirous of arriving at a proper and true estimate of the actual amount of anæsthetic effect produced by congelation upon the teeth, I submitted, for the acquisition of such knowledge, to the loss of a first upper molar. The operation was unusually long and severe. My assistant (the operator) was compelled to use immense force to detach the tooth, owing to the curving inwards of the extremity of the fangs. A more severe case can rarely happen in practice. Yet, I can most confidently assert *that I felt not the slightest pain* throughout this long proceeding.

The experiment took place in the presence of two witnesses, one of them a surgeon dentist; and, having expressed my own experience, I append their evidence of what they saw.

"Most readily we give our testimony to one of the great phenomena of this age. Great as was our confidence in your previous assurances of what you had accomplished on others, it has been perfectly eclipsed by the *unmistakeable painlessness* of the dreadful operation we have this day witnessed on your own person. Rarely, indeed, does it fall to the lot of a dentist to perform an operation of greater severity than that to which you were subjected. We feel no hesitation in saying, that under ordinary circumstances it could scarcely have been borne, however great the power of endurance: yet the closest inspection of your countenance could not detect the slightest wince, (and it would be difficult for a dentist to be deceived if pain were present,) you maintained the most perfect calmness and composure throughout the whole proceeding, and we feel bound to affirm that such composure could only be sustained under a perfect *immunity from pain*. The fact which we have witnessed is a proof beyond all doubt that dentistry has come to the humane and painless.

JOHN WHITEMAN WEBB,
Surgeon Dentist,
21 Southampton street, Bloomsbury
W. H. THORNTHWAITE,
123 Newgate street."

I am indebted to my friend Mr. Webb, of Bloomsbury, for the following additional evidence of the efficacy of this new method in his own practice.

"I have now used your apparatus for producing anæsthesia by cold, in dental surgery, for some time past, and am happy in being enabled to say, I have applied it with great success.

"It appears to me that the great merit of the apparatus consists in its being the most scientific and effectual method of inducing local anæsthesia by congelation; while at the same time insensibility of the part is produced without causing pain to the patient, in fact, it renders the application of the cold as painless as the extraction of the teeth. It is a great fact that we are now able to abolish the pain of tooth-extraction, so much dreaded by patients; and that persons of the most delicate and nervous temperament can bear the operation without any shock to the system, and with freedom from all the stupefying effects produced by chloroform.

J. WHITEMAN WEBB."

And lastly, Mr. Robinson affirms in his article on anæsthesia in dental surgery, which appeared in the last number of this Journal, that in nine cases he "*had succeeded in the removal of the teeth without pain*," by the application of cold, although the apparatus he employed on these occasions was signally defective in the one most important particular, which had escaped his notice in imitating that which we have for many months used. The evidence, however, thus given by Mr. Robinson, is worth this much, that tooth-extraction may be rendered painless by the anæsthetic application of cold. And his evidence, taken in conjunction with that emanating from professional men, patients, and other dentists, removes the subject out of the sphere of mere hypothesis or skepticism, into the domain of true science and actual fact.

The *modus operandi* whereby the anæsthetic effect of cold is produced, mainly consists, we believe, in *an arrest of the circulation* in the part to be operated upon, and just in proportion as this is effected, is the amount of diminution of the pain. As the cold fluid continues its course over the gums, the blood vessels contract, and stop the supply of the circulating fluid to the part, which part consequently assumes a perfect bloodless and blanched appearance. When this state supervenes, all sensibility in the gums is destroyed, so that operating instruments may be used with freedom in this region without the patient suffering any

pain. But this is not all that is required. The soft tissue of the gums, succumbs much more readily to the action of the cold, than does the hard bony structure of the teeth or alveolus. If, therefore, the application be stopped when the gums first assume the blanched appearance, and the extraction be proceeded with. there will, in all probability, be more or less of pain attending it. Every substance has its own peculiar power and rate of conduction of heat or cold. It is well known that bone is a slow conductor. Its own time must consequently be given it to conduct the cold, in the case of a tooth, throughout its entire surface from the crown to the apex of the fang. It must not be forgotten that the tooth rests in a bed, wrapped round with membranes, through whose vascular tissue an ever renewing warm fluid is circulating. The power of that recurrent fluid must be overcome; it must be driven back from its accustomed channels, and then, when these membranes are pale and cold, the tooth may be withdrawn without the endurance of that horrid wrench which forms so large a proportion of the dreaded pain. And lastly, the blood being forced out of the vessel entering the apex of the fang by the advancing cold, deprives its associated nerve of its sensitiveness to interference and suffering.

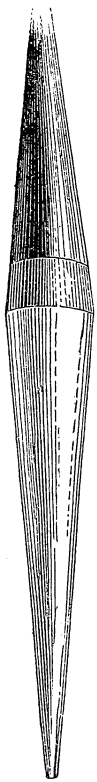
The correctness of this explanation is corroborated by the fact, which experience has amply revealed, that in proportion as the entire tooth is pale and cold when extracted, is the degree of immunity from suffering. In the first case cited above, for example, in which one stump was extracted under the influence of the cold, and another without any such application, the difference, both in temperature and appearance, was very remarkable. The one was pale, bloodless and cold, while the other, which gave so much pain, was highly injected and warm. I adduce this in illustration, as a type of every successful case. The limits of this article do not permit me to enter into detail upon this subject. I hope to be able to lay before the profession, the results of my experiments and experience on the power of conduction, possessed by such structures as those of the teeth, in another paper, which may serve as some guide in the practical application of this new anæsthetic.

[TO BE CONTINUED.]

HANDLES FOR PLUGGING INSTRUMENTS.

In accordance with promises made in a late number, we present to our readers the wood cuts illustrating modifications in handles for condensing instruments, the utility of which is being daily proved.

No. 1.



In our own practice, we discard entirely the octagonal handle which has for a long time been almost universally used *for all* plugging instruments, and have adopted the three patterns indicated by the engravings, each handle being so adapted as to apply in certain directions, the greatest amount of pressure, combined with security of grasp, comfort to the hand, and perfect control in manipulation.

The handle No. 1, is cylindrical at the ferule, tapering to a point. This instrument is intended solely for filling cavities in the approximal surfaces of teeth where the interspaces are so small as to prevent or interfere with the use of a direct plugger. In these cases a *rotating motion* is required; the cylindrical form is the one most perfectly adapted to this kind of pressure. The instruments adapted to this style of handle should be made in pairs—one for the right and one for the left side. But of this hereafter.*

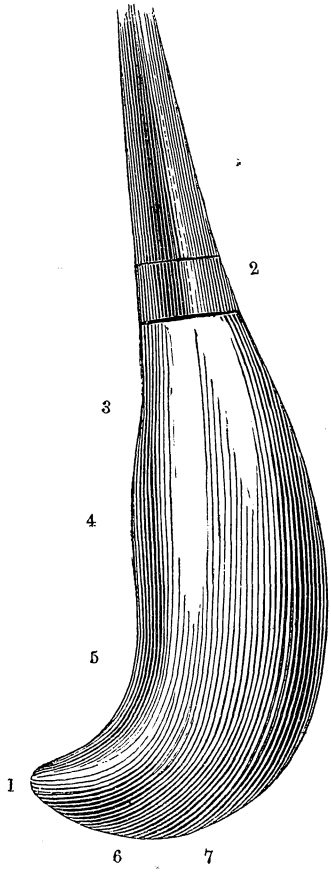
With the octagon-shaped handles now in use, we always noted one great defect. They are top-heavy, and when the instrument is delicate, the ends of the fingers while grasping the handle, are brought too closely in juxtaposition. This is a very great inconvenience, not only causing a loss of power and control, but being exceedingly fatiguing. The only analagous case we can "conjure up" would be that of a man writing with a medium-sized pen with a pressure equal to twenty or thirty pounds at each stroke of the pen. Dentists have submitted to this infliction

* [It is our purpose to speak in future numbers of the Recorder, most particularly of instruments and instrument points, and for the further exemplification of our ideas, we shall call in the aid of the *steel plate* engraver.

day after day, and year after year, with an amount of resignation and patience that would have thrown Job into "outer darkness." And yet, if a bank clerk was to write for two hours with the aforesaid pen without swearing, he would, without doubt, be considered "most eminently a christian man."

We have endeavored to obviate this difficulty, first, by enlarging the diameter at the ferule; second, by tapering towards each end, thus balancing the whole more effectually; the first modification also gives us additional power by increasing the *long arm* of the lever.

No. 2.



Handle No. 2 is intended to be used where great pressure is required in a direction with the length of the tooth—*i. e.*—from crown to fang; instruments with these handles are admirably adapted for filling cavities in the grinding surfaces of molar teeth. For filling teeth in the upper jaw the handle should be grasped so that the thumb will rest upon the ferrule at 2. The 1st, 2nd and 3rd fingers encircle the handle at points in a line with 3, 4, 5, and the point 1 to rest between the third and fourth fingers, thus leaving the rounded butt of the handle secure and firm in the palm, and the axis of the instrument continuous with the length of the wrist and fore arm.

Such an instrument, thus held, insures to the operator greater control, greater force, and greater ease, than any thing we have yet seen in the shape of a condensing instrument.

For the lower jaw, the same handle is to be used, with the po-

sition reversed—the first, second, third and fourth fingers encircle it at Nos. 5, 4, 3, and 2, and the thumb rests at the curve, 1, 6, 7.

No. 3.

We come now to handles required for instruments such as are necessary for filling cavities in the sides of teeth, either approximal, lingual, or buccal, but which do not require a rotating motion. For these instruments we consider handle No. 3 to be well adapted. Such instruments are grasped between the thumb and first and second fingers. By bringing the extremities of these members together so that they barely touch, a triangular space will be observed; it is obvious that any instrument so shaped as to fill up the vacancy will make the hold of the fingers upon it a secure one, and give greater ease to the holder than any coarser adaptation could do. In filling cavities upon the buccal surfaces of teeth, the pressure of the thumb upon one of the planes of the prism will be found not only easy and secure, but the amount of pressure that can thus be made, will astonish any one who has never tried the experiment.

Upon the end of this handle, a small knob or button is left for the purpose of protecting the palm of the hand when pressure is made in the direction of the long axis of the instrument. A further protection can be had by wearing the ordinary socket ring used for resting drills and burrs against. The socket ring has also the advantage of dividing this pressure by bringing into play the sustaining force of the middle finger.

R. H. S., of Ohio.—Chloroform dissolves gutta percha. If you take a solution of it, and filter it beneath a bell glass to prevent evaporation, the solution will pass through the filtering medium perfectly clear, and almost colorless. Then evaporate the chloroform, and you will obtain white gutta percha. You also wish to know how it can be rendered "hard?" Why it is a hard substance when kept below a temperature of 60 degs. It can be made as hard as wood, however, by kneading it with chalk and ground sulphate of magnesia, then heating it up to 212 degs.—*Scientific American.*

EDITORIAL.

☞ CORRESPONDENTS, SUBSCRIBERS, EXCHANGES, &c., are requested to direct all Communications relative to the financial or business departments of this Journal, to "SUTTON & RAYNOR, 609 Broadway, New-York;" and articles for publication, books for review, exchanges, reports of society meetings, and all correspondence belonging to the editorial department, to "EDITOR OF DENTAL RECORDER, No. 139 Fourth Avenue, New-York."

In the present issue of the Recorder our readers will find the wood cuts of instrument handles, which we were prevented, by the press of matter, from publishing in the December number. We are glad to know that the new patterns are generally considered by those who have seen them to be an improvement, and our experience in their use teaches that with them more can be accomplished in a given time, with less fatigue, and more certainty of application, than with the styles heretofore in general use. The facility with which they are grasped, and the security of the hold, tends greatly to aid in the direct application of the condensing surfaces of the instruments to any desired spot, thereby lessening the danger of those accidental slips, always mortifying, and sometimes serious in their results. This, of itself, is an advantage not to be looked upon slightingly. The greatest drawback they offer is in the item of expense; the cost of carving them, and the waste of material being greater, of course the expense must be proportionably increased. We think, however, that any operator will, after a week's use of them, feel satisfied that within that time they have more than repaid him for the difference in price. Their construction is, however, perfectly simple; they can be made by any instrument manufacturer, and only require an additional amount of time, labor and material, as compared with other patterns.

We are unavoidably prevented from re-publishing Prof. White's article on the dynamometer (with a cut of the instrument.) We consider the dynamometer to be an exceedingly ingenious and useful instrument. For purposes of experiment or illustration it must prove valuable, *particularly to those who can make the distinction between the gross amount of pressure required to complete and perfect a filling, and the amount of pressure made by a single application of the plugging instrument.*

It will be seen by the published proceedings of the Pennsylvania Dental Association, that a report has been *adopted* by that society adverse to the use of crystalline gold. We are informed by one of the members of the committee that the report was not intended to apply to the present preparations—*i.e.* those now offered for sale by the manufacturers. If this was the intention of the committee, we

must confess our conviction that the idea has been very obscurely expressed. We have also been informed that certain members of the committee, who have used more of the new material than the others, did not sign the report. Their names, which have been furnished us, are not appended to the report as published; but, as there is no allusion made to any dissent, and no minority report has been made public, we are inclined to set this down as mere rumor. We would advise those of our readers whose experience has satisfied them of the utility and availability of crystalline gold for the purpose of filling teeth, to act without fear upon the strength of their convictions; and to those who have not used the new agent we would say—First satisfy yourselves as to the nature, qualities and purity of the material; and then, if you experiment, do it cautiously but thoroughly; gain what experience you can by working with it out of the mouth; and when you have acquired sufficient experience in manipulating, if you are not satisfied with it, don't use it at all; and if you are satisfied that it can aid you in your practice, use it at first in simple cavities that are easy of access; and as you progress in power and skill in its practical use, you can extend your field of operations to an extent not yet defined or limited. Bear always in mind that nothing can be done without suitable instruments, and that they are worthless unless used with a determination to work the gold thoroughly; make every layer solid before another is added; be careful to keep the surface of your gold rough and dry; patience, perseverance, good instruments, bibulous paper, and crystalline gold, together form a combination that will save a vast number of teeth hitherto condemned as being beyond the reach of our art. We have saved many such, that bid fair to outlast, by many years, the little excitement that may be occasioned by the report above alluded to.

AMBLER *vs.* PARMLY.—This suit, for libel, damages laid at five thousand dollars, came off last month at the Superior Court of this city. The case occupied some two or three days of time, which was doubtless more profitable to the attorneys than to the litigants. The jury, after an absence of a few minutes, returned for instructions relative to the amount of damages required by law to carry the costs of the suit, one of the jury stating that they had concluded not to allow any "damages," but to require the defendant to pay the costs. His Honor informed them that in order to lay the costs upon the defendant, a verdict must be rendered for damages to an amount exceeding fifty dollars. The jury hereupon retired, but returned in a minute or two with a verdict for plaintiff, with damages in his favor of fifty-five dollars; being the slight discount upon the amount claimed, of four thousand nine hundred and forty-five dollars.

New-York Dental Recorder;

DEVOTED TO THE THEORY AND PRACTICE OF

Surgical, Medical and Mechanical Dentistry.

Vol. X.] FEBRUARY, 1856. [No. 2.

CASES FROM MY NOTE-BOOK.

BY WM. A. PEASE, DAYTON, O.

Dec., 1850.—Mrs. L—— consulted me with reference to her mouth; aged about 30; strong and healthy. Was suffering intense pain in her face, extending from a little above the fang of the cuspidati, and the lower border of the *alæ nasi*, to the neighborhood of the *antrum*; the most acute pain being a little above and to the side of the lower border of her nose. She had worn an artificial denture for about two years, consisting of the four incisors, two right bicuspids, and the first left bicuspid; the set was attached to the second left bicuspid and second right molar; both healthy; the canine teeth also healthy and sound. The pain was deep seated and intense, yet there were no symptoms to implicate the cuspidati. Her gum and lips were badly ulcerated, the mucus membrane generally sloughed off, and the ulcers were burrowing in the lips in several places, with patches on the inside of the cheeks. At that time there was nothing to indicate more than ordinary ulcerated sore mouth, the ulcers no worse than are frequently seen in the mouths of nursing women; however, she had not nursed for several years. As she had come from the country for treatment and was accessible, I directed cold applications to her face; touched the worst ulcers with kreosote, and the lips and gum generally, with a strong mixture of chlorinated myrrh. To call again in the evening.

4, P. M.—Pain unabated; ulcers increasing on the inside of the lips and cheeks; no symptoms of more than sympathetic implication of the cuspidati; not sore or painful to the touch, or

the tap of an instrument. Re-touched the ulcers with kreosote, and the worst one, over the left superior cuspidati, with nit. argenti; swabbed the lips and gum as before; if unrelieved by bed time, to take an anodyne, and apply hop fomentations to face.

Morning.—Passed a bad night; pain unabated; ulceration much worse, burrowing into the substance of the lips and cheeks; teeth same as before; ulceration had progressed so far as to affect the cuticle. About on a line with, and a little to the left of the left *ala nasi*, mortification was about setting in over a surface as large as a sixpence; the cuticle had changed color, looked leathery and dead, in striking contrast with the surrounding parts.—There was a well defined serrated edge or margin, and a fine, nearly uniform thread-like line of crimson divided the gangrenous from the healthy portion; there was no inflammation, or redness of the parts exterior to this line, as in erysipelatous inflammation. This patch was increasing, and I feared there would be a hole in her cheek, even if it did not involve a large portion of her face.—Asked for counsel, as I had now a formidable disease to combat, in the shape of gangrenous sore mouth; was met by Drs. Steeles, father and son. As soon as the elder Steele had seen it, he exclaimed, Cancrum Oris! Cancrum Oris! bad! After carefully examining the mouth, they were of opinion the cuspidati teeth should come out; that there were no counter indications to the little depletion attendant on extraction, as the patient was strong and healthy; the bleeding would likely, even if the teeth should prove healthy, lessen the pain in the cheek, which was the most intense a little above the ends of their fangs; would afford an opportunity to apply anodynes, or other agents, nearer the seat of the disease, or to perforate still deeper into the spongy bone, and, if they were the cause of the disease, a favorable effect could be produced. I ventured to dissent from this opinion; saw no cause for extraction; teeth but secondarily implicated, if at all; the pain would be temporary, &c., but consented to a compromise; one tooth to be extracted—if no markedly favorable results followed, the other to be spared. The left superior cuspidati was extracted, and found to be perfectly healthy; on splitting it open, the nerve was uninflamed, and it was normal. The sound discovered no disease of the socket; no diminution of the pain; a pledget of cotton, wet with a solution of opium and belladonna,

placed high in the socket. Re-touched the ulcers with *nit. argenti*, and blackened the face over a large surface. Solution of myrrh as before. To see her again in the evening.

Evening.—Pain much the same; ulceration progressing slowly; pupils dilated; re-touched the ulcers with *nit. argenti*; swabbed the gum with chlorinated myrrh; to keep the lips and gum apart, with pluggets of cotton, moistened with myrrh; fresh anodyne to the socket; to take an anodyne at bed time.

Morning.—Pain somewhat abated; ulceration stationary; the smaller ulcers begin to take on healthy action; re-touched the larger ones with *nit. argenti*; removed the accumulated mucus with swab moistened with dilute myrrh. To use sage tea as a wash; fresh anodyne to the socket, from which there was no discharge. From this time she continued to amend, employing only mild washes; yet for several days there was danger of the patch separating from the surrounding parts; though somewhat diminished in size, this place still retains the dull, white, leathery hue, in striking contrast with the floridity of the adjoining parts. From that time to October last, she has suffered but little from her face and teeth. She has kept by her a wash, and on one or two occasions, when apprehensive of difficulty, she has early resorted to it with favorable results.

During a journey to visit her friends this fall, she raised the window in the car and allowed the air to strike on the right side of her face. She arrived home with pain in her face similar to that she experienced before; she resorted to her wash, and in applying it, dropped the phial and broke it. Called on me; stated she believed she would be as bad as before; she had intense pain in the right cheek, extending from the cuspidati to the second molar; mucous membrane sloughed off, or hanging in white patches — perhaps in part from applications — deepest over the cuspidati and the place occupied by the first molar. As I was very busy, and apprehended difficulty, gave her a wash, and advised her to call on her physician, and he would probably prescribe something to relieve her. She soon returned, saying she wished me to open her jaw, to let out the matter, — i. e., perforate the *antrum*. I could discover no indications of pus, besides, only about thirty hours had elapsed since acute pain com-

menced. She insisted, and to gratify her, yet without any expectation of benefit, I passed a small drill up through the spongy process in the place from which the first molar had been extracted. As I expected, there was no discharge, and a straight and curved probe discovered no tenderness or indication of inflammation; pain still excruciating. Met with her physician, examined the sinus together — no determinate results. I, to prepare a wash for her mouth — he, one for external application to her face, of chloroform, laudanum, as principal ingredients, with whatever else she might require. She retired.

1 o'clock, A. M.—Called to see her; found her suffering in tense pain; forehead covered with a wet napkin, often changed. Her cheek, from near her eye to a line in continuation with her mouth, vesicated in patches by the chloroform, laudanum, &c.; as often as it evaporated from one bit of muslin, another wet one was applied; she wished me to open the *antrum* and see if there was not matter in it; probed it without any results; no indication of inflammation; anodynes had produced no effect on her. It was evident she would get no rest, that the chloroform and laudanum, &c., was inefficacious, and if continued, would soon raise a blister over her whole cheek, and it was doubtful whether that would diminish the pain. To be discontinued; to apply bits of ice as large as an egg to the cheek, as one melted, to apply another. In five minutes she was relieved, and suffered but little pain from that time. To use her expression, "it seemed to freeze the pain out of it by freezing the bone." She had a rapid recovery, as the washes had induced a healthy action in her mouth.

Case 2d.—April 19th, 1855.—J. C——, aged 19, visited me by appointment; stated a homœpathic physician had been called to see her; he said her *liver* was diseased, and he had given her some medicine to act on it, which had salivated her very badly; she had dismissed him and employed Dr. ——, who applied kreosote to the gum and ulcers in the cheeks and tongue. After two months' trial, thought she was a little better.

Condition.—The edges of her tongue serrated from bad ulcers, which had eaten away about one-third of its width; unhealthy; looked like a double-edged saw; gum in wretched condition; teeth loose in their sockets; pressure over the sockets caused a

very offensive discharge of pus; cheeks badly ulcerated; much substance destroyed. In places, thin films of newly-formed membrane showed an effort at recuperation, but the cicatrix was unhealthy; the ulcers were indolent and foul; teeth generally healthy and fine; the first right and left inferior molars broken off, the second molars much diseased; extracted the first molars. To suspend the kreosote; apply strong chlorinated myrrh; to return in four days. Six days returned; tongue better; ulcers cleaner, granulating; cheeks much the same as before; extracted the second molars, and first right superior molar, as they were badly diseased; discharge from the sockets continues. To continue the wash, and take three times a day, Sarsp. Comp. and Hyd. Potassa, viz: Sarsp. Comp. ʒ viij., Hyd. Potassi, grs. to teaspoonful 3 times a day; to return in three days, sooner if convenient. Returned in three days, much improved; to continue as before; to return again in three days. Again much improved; to still continue the medicine, but in reduced doses. From this time, continued rapidly to improve, and shortly after, called to show me that her mouth was well.

TREATMENT OF DENTAL CARIES WHEN COMPLICATED WITH AN IRRITABLE OR EXPOSED PULP.

BY JAMES TAYLOR.

In our last article several typographical errors occur, one of which completely changes our expression, and which will be found on page 45, and 18th line from the bottom. Instead of "It is not fair to infer," it should read, "Is it not fair to infer?" We might very properly head our present article with this question, How shall we properly diagnose an irritable pulp? We wish, for instance, to know whether the pulp is in merely an irritable condition, or if it is actually exposed. Our first observation is made simply with the eye. The decay appears, by its size and the color of the tooth, to penetrate near the nerve; and we now interrogate the patient, and we get for answer, the tooth has been *grumbling* for some time. The evidence, so far, is of a doubtful

character. This *grumbling* may be the result of exposure, or it may not.

We ask still farther, what effect has heat or cold on the tooth? We get for answer, either cold or hot fluids give pain, or, what is more frequent, cold water gives great pain. Still there is doubt, because an irritable pulp, having but a thin lamina of inflamed bone as a covering, may give all this pain. We now take up our instrument and attempt to clear the cavity of some of the extraneous matter which has gotten into it, and the slightest pressure gives pain; the patient exclaims, you press on the nerve. Still we may not pronounce the pulp exposed. We may even take a small ball of soft cotton and attempt to dry out the cavity, and the pressure of so soft a material gives great pain, and yet the pulp is not exposed. So that the tooth may really have been useless for masticating purposes for weeks, or even months; it may be highly sensitive, either heat or cold producing pain, and indeed it may have occasionally ached for one to two or three hours at a time, from either pressure of foreign matter in the carious cavity, or from exposure to cold, relief being only obtained by removing the foreign substances from the cavity, or by coming to a warm room, or getting warm in bed.

All these symptoms, we say, are not sufficient to diagnose an exposed pulp. They all may, and often do exist, when the pulp is not exposed, but is merely in an irritable condition.

If, however, the pain becomes continuous, and is increased instead of diminished on going to bed, and assumes more of a sharp and then *throbbing* character, we may safely infer that the pulp is either exposed, or has become involved in the general inflammation; and unless this is promptly relieved, its destruction is inevitable.

We have shown how very deceptive these symptoms may be; for we may often have violent pain as the result of mere sensitive dentine. The vitality of the organ is exalted by the irritation of the disease, and this is particularly the case in the white and brown *variety* of *caries*. We also find the pulp exposed when none of these symptoms have manifested themselves. This occurs often in black caries when it assimilates the brown, or we might perhaps say the brown when it assimilates the black.

It may be asked, is there any positive symptom by which we

may determine the condition of the pulp, without removing all the carious matter to see if it is exposed by the disease? or, in other words, to see if the dentine has been utterly decomposed to the pulp? We would answer that we have one *unerring* symptom, which, if present, always speaks favorable for the condition of the pulp. We allude to the sensibility of the dentine under the enamel, or around the carious opening, at a distance from the pulp cavity.

We rely so much on this symptom, seeking here for that vitality which is so essential to the organ, that unless prolonged and severe tooth-ache has been present, or the tooth has lost its vital shade of color, we are never content to pass an opinion until we have carefully cut away the caries at some point farthest from the nerve, and ascertained the condition of the dentine. We prefer an exalted sensibility to an obtunded one; the latter we regard as the exhausted vital energy so much dreaded in typhoid fever; the former as perhaps denoting an excessive nervous irritability, yet giving assurance of a vital power and energy on which it is far more safe to rely. We have the means at hand to subdue the one, but where shall we find the agent to restore the other?

We are prepared now to consider the causes producing an irritable condition of the pulp. The first and most direct cause is caries. This is a diseased condition of the dental organs, resulting in decomposition of the tooth substance; but it may be asked, does this always induce irritability of the pulp? We answer not; but it depends very much on the agent inducing the disease, and the general condition of the secretions of the mouth. In some cases, the cause of caries appears to completely obtund the sensibility of the dentine as rapidly as decomposition takes place; while in others we have increased sensibility, and this increased sensibility may be induced by an acid condition of the secretions of the mouth, and yet the direct cause of decay be the same as when the sensibility is obtunded.

We regard it important to properly determine if the secretions are of such a character as to induce irritation. If such be the fact, due attention should be given to them with proper neutralizing remedies.

Inflammation of the pulp of one tooth may, and does, without doubt, produce irritation of the nerves of all those teeth on the same side of the mouth, and sometimes of all the teeth. This irritation will be particularly felt in the teeth when caries approximates the pulp. This is manifest from the fact, that an aching tooth often involves other teeth much decayed, and so much is this the case, that patients often lose sight of the one that is really producing the difficulty.

Every practitioner is familiar with such cases, often being required to extract teeth from the wrong jaw. Inflammation of the gums will also induce irritation of the pulp when near exposed. We have really a two-fold influence operating to induce irritation: first, the inflammation of the gums; and, second, the acid condition thus induced in the secretions.

Imperfect dental operations and general constitutional irritability will, with many other causes, excite irritation in the pulp but thinly covered by dentine; extremes of heat or cold is a very common cause.

With this view of the case before us, we are prepared to treat it understandingly, regarding inflammation of the gums and tooth-ache as direct sources of irritation. The first thing to be done in the treatment of irritable pulps, preparatory to filling the teeth, is the removal of all aching teeth, which, upon examination, we find should be extracted to put the mouth in a healthy condition, all roots of teeth which are sources of irritation—the salivary calculus which keeps the gums inflamed. This, as far as possible, may be done at the first sitting, and then such detergent and astringent washes as may be desirable to allay irritation and restore health. If constitutional disturbance is manifest, some general remedies should be prescribed to meet the case; generally a mild cathartic will be sufficient, or, if much nervous excitement is present, an anodyne may be administered.

The most prominent difficulties having been thus overcome, our attention should next be directed to the organ or organs we may wish to preserve.

This preparatory treatment generally modifies very much the acid condition of the secretions of the mouth, and we are now prepared to pay attention to the direct effect of the carious matter which covers the pulp itself, and which we must regard also as an irritant.

We are satisfied that the treatment, thus far directed, will often completely change the condition of the organs we may wish to preserve. This will be noted by the less amount of pain, and the ease with which cold and hot fluids may be brought in contact with the teeth. Yet, although much has been accomplished in the preparation for filling such teeth, there is often still much to be done to prepare difficult cases of this kind for filling.

Our attention is then next directed to the carious portion of the tooth to be removed. This should be carefully removed, excavating first that which lays farthest from the nerve. In doing this, if pain is induced, we prefer only removing a part at one sitting, and then introduce a small pledget of cotton, moistened with creosote dipped in tannin, covering the whole, or sealing up the tooth, with wax or gum mastic. This operation we repeat every day or two until the entire decayed portion is removed, and the cavity will bear the introduction and compacting of cotton or some such substance without any special pain.

We have frequently resorted to the use of collodion, but this generally induces more pain when first applied, and we have not found it so reliable as the creosote and tannin, which, by the caustic or antiseptic property of the one, and the astringent of the other, appears to exactly meet the exigency of such cases.

It would be well to bear in mind that all arsenical preparations are here inadmissible. The close proximity of the pulp prevents the use of those remedies which might be available in the treatment of mere irritable dentine. Chloride of zinc, which at times is a very efficient remedy for the treatment of inflamed dentine, we also discard in cases of irritable pulp, and agree with Prof. G. Watt, who, in speaking of the use of this article as an escharotic for inflamed dentine, remarks: "Of course, it should never be used when it is practicable to restore the inflamed part to its normal condition." And he further remarks, that "the subjacent tissues are left in a healthier condition after its use than after nitrate of silver and some other caustics, but the loss of substance is greater."

It is this loss of substance and the danger of inducing inflammation of the pulp which forbids the use of any caustic preparation, having an affinity to the lime of the tooth.

We regard the creosote as not of the same character as the

caustic potassa, nitrate of silver, chloride of zinc, &c. The direct action of the agent (creosote) on inflamed dentine is rather difficult satisfactorily to explain. It is regarded by Webster, Ure, and other authors as an antiseptic and powerful stimulant. Its direct action on the mucous tissue appears to be caustic; its direct effect on inflamed dentine is to relieve pain, and not to diminish the sensibility by any caustic property. That its antiseptic property may be useful in preventing decomposition of that lamina of bone which is inflamed, and which is the only covering to the pulp, we think is highly probable. We see no reason why antiseptic remedies should not be resorted to in such cases for such an object, as well as to prevent disorganization of other tissues of the economy when laboring under disease.

Considering the true pathology of the disease under consideration, and the known antiseptic property of this remedy, we then prescribe it for a two-fold effect; first, its penetrating soothing influence, and, second, for its antiseptic action on that portion of dentine, which we wish to preserve from disorganization.

Pathologically, there are several questions in relation to the condition of this lamina of bone which covers the pulp which are important.

Regarding caries as strictly of chemical origin, can we, by the removal of that part of the tooth already decomposed, be certain that we have removed all the agent inducing disease? Does this decomposed structure hold in solution the chemical agent for the further destruction of the tooth? Has not the chemical change which has taken place in these constituents made of it a neutral agent? Such appears to be the law of chemical action. If so, the lamina of bone beneath this decomposed structure has received already a charge of decomposing fluid, or it is passed from the secretions of the mouth through this carious matter to this part.

Any given portion of an acid cannot take up more than its quantum of lime; when this is done, all action ceases. In the brown variety of caries we find that generally the lime is completely removed. The carious matter is at least of a cartilaginous structure, and the lime is being removed as fast as the chemical agent can effect it. This view of the subject enables us to have some idea of the kind of an acid inducing the disease. It should

also point out a suitable neutralizing agent. If, for instance, by proper tests, we detect traces of acetic acid in the saliva, wash out the carious cavity with the solution of some substance with which this acid will unite more readily than lime. If the muriatic or nitric acids, use also an agent with which these will unite more readily than with the base of the teeth.

In the treatment, then, of irritable pulps, we regard the washing of the cavity out, from time to time, as we remove the caries, as of some consequence, thereby neutralizing the agent causing the tooth's decomposition. Tepid water used freely is a powerful neutralizer, and when this is used, no deleterious compound is left in the cavity. We have often used a solution of the sub-carbonate of soda or carbonate of magnesia.

If this lamina of bone which covers the pulp has already received a charge of decomposing fluids their first action appears to be to induce inflammation of the dentine, and then a disintegration of its parts, neutralizing agents must arrest this action or the increased vitality induced, arouse nature to resist and restore, or the amount of acid received will spend its force and not cease to act until it has become neutralized. Chemically considered, the latter would appear to be the effect, and yet will not a living tissue resist this action when a dead one could not? Can the calcareous elements be removed, say chemically, from the tubuli of which the dentine are composed, and those tubes themselves be not destroyed? Or can a deposition of lime take place, repairing the loss? Nature may be insufficient for this task. Yet she goes to work to protect herself, and not only deposits new bone for a covering, but condenses and hardens that which is not destroyed.

It should be borne in mind that, in the treatment of the pulps of teeth thus far considered, we have not an utter exposure, and also that we have to treat a lamina of inflamed dentine. The treatment is to preserve the vitality of the tooth, and this the only covering to the pulp.

We regard this covering, although diseased, as a far better covering than any other which can be substituted in its place.

The question might very properly be asked, should this covering be retained, even if its vitality cannot be preserved? We answer, by all means, unless its constituents are disintegrated or

inflammation supervenes in the pulp requiring its destruction. If the latter takes place, it will be denoted by increased pain, soreness of the tooth when struck upon, &c.

The treatment proposed will generally diminish the sensibility in from four to ten days, and when such is the case and the carious portion can be removed, the tooth is ready for filling.

We have still, however, one resource left us, after all; these remedies have been used, and the tooth is still too tender for a solid and permanent filling. It is this: Remove all the softened caries, preparing all the walls of the cavity for a plug, but leaving over the nerve all of the partially decomposed dentine which cannot be removed without much pain; wash out the cavity well with warm water, then take of Hill's soft filling material and cut a cap of the same to lay over the pulp cavity; fit this carefully over the same when in its hard state; then with a sufficient quantity of the same, properly warmed, fill up the entire cavity.

This excludes all foreign matter, and, being a non-conductor, prevents the extremes of heat or cold from affecting injuriously the tooth. This should not, however, be done until the general irritability has passed off This we regard as a temporary operation, giving time for the pulp organ to throw out a deposition of bony matter sufficient for a proper covering. We leave this in from one to six months, and within the last week took out one which had been in for two years. In this latter case, the tooth was too tender for masticating purposes for over six months. On its removal, we found the pulp alive, and but little decomposed dentine in the bottom of the cavity. When this was removed, which was dry and powdery, the dentine was hard and glass-like. In this case, as in most of such cases, the inflamed dentine was well preserved; and hence the agent inducing decomposition had all been removed or well neutralized.

For these temporary fillings we prefer this material and this course to any of the gum preparations, which would have to be renewed frequently.

For some time, a few years back, we frequently used the Collodion, applying it with enough cotton to fill the cavity, also relying on it, more or less, to subdue the irritability of the den-

tine and pulp; but the pain, on its first introduction, appeared to render it less reliable than the creosote and tannin.

We come now to speak of that condition of the pulp called exposed, or when the caries has reached this organ, the dentine having been utterly destroyed or decomposed. We shall first speak of the treatment we adopt for its preservation, and then, when this is impracticable, the means left us still for preserving the tooth by its destruction.

We have not thought it necessary to give any special directions as it regards the filling of the teeth after the preparatory treatment which we have given. We would, however, simply remark that the method of filling is just the same as in those cases where this treatment has not been necessary, except that, when the teeth are still sensible to the extremes of heat or cold, we apply over the nerve a non-conducting material. This is generally made of Hill's soft filling, sometimes oil silk, asbestos, &c., &c.; but of late we have discarded almost entirely all these materials but the former, because we have found it more easily adapted to the bottom of the cavity, and equally as reliable.

LOCAL ANÆSTHESIA BY CONGELATION IN DENTAL SURGERY.

BY J. RICHARD QUINTON, LONDON.

[CONTINUED FROM PAGE 19.]

But, it may be asked, admitting that by the application of intense cold, we may mitigate or abolish the pain of tooth-extraction, may it not be productive of serious mischief to the tissues of the mouth? Will not the parts lose their vitality and slough away? No objection to this mode of anæsthesia is more common and none more groundless. In order to determine the force of this ever ready objection, and to ascertain what the actual results of congelation were, I have instituted a series of experiments on the lower animals, and on various surfaces of my own body. I can only here state the general result. On no occasion, though in many instances the congelation was very protracted,

have I witnessed or suffered from any symptoms more aggravated than an effusion of serum beneath the cuticle. A certain degree of redness has been present, though persistent only for a short time; but no suppuration or sloughing or other symptoms and terminations of inflammation. It were as rational to give the name of inflammation to the suffusing blush of modesty, as to denote by that term the effects of congelation. Dr. Arnott's experience coincides with my own. "Not an approach," he says, "to inflammation has ever followed the longest continued congelation." I have now employed a degree of cold varying from 10° above zero to 15°, (and often as low as 40°, where inflammation has been present) below zero, in a very large number of dental operations, without meeting with any of those grave results and serious disorganizations, to which fear, ignorance and prejudice had given imaginary existence. Rarely I have found the epithelial or epidermic covering of the gum peel off, but this has never been a source of inconvenience or injury; being limited only to the immediate vicinity of the part operated upon. The antiphlogistic property of cold itself, is a sufficient answer to all hypothetical conclusions as to its results.

Complications, of course, may arise under the anæsthetic use of cold in dentistry, as in the ordinary mode of practice. These complications may be unfairly put to the account of congelation, as, when chloroform was first introduced, every complication was alleged to be due to the chloroform. To this class belong the two cases of hemorrhage adduced by Mr. Robinson. It was certainly a singular coincidence that two out of nine of his cases should have so resulted. If chloroform had been given in those cases, would Mr. Robinson have attributed the hemorrhage to the chloroform? Hemorrhage, and severe hemorrhage too, is not an unknown occurrence in dentistry. I do not presume to account for the alleged hemorrhage in these cases. I have not met with a single case of the kind in all my practice with congelation. I know not with what show of reason such an occurence can be at all due to a *properly directed* employment of congelation. In the seven remaining cases recorded by Mr. Robinson, no unusual hemorrhage occured. And even though some suspicion were admitted to rest upon the congelation as the cause, it must be remembered in the first place, that the operations were performed

upon an erroneous principle of applying the cold—one, which might possibly so act upon the blood-vessels as to bring about such a result; and in the second place, that proper care was not exercised in graduating the return of the blood-vessels to their normal condition and functions. The business of the anæsthetiser is not over when he has frozen down the tooth, and extracted it without pain, for, as he has induced a suppression of the normal action of the part, so must he with a wise precision and due attention, *restore* that part to its normal functions.

I wish to claim for congelation as an anæsthetic in dentistry, no more than its true value. That under proper management it is effective in the great majority of the cases which falls into the dentist's hands, experience satisfies me. That it will wholly abolish the pain of extraction in every case I do not at present pretend to affirm, though future improvements may realize even that desideratum. That it must mitigate pain to a considerable extent in every instance, I feel justified in asserting. Cases ever and anon occur, which I need not enumerate, the severity and duration of which, call for an anæsthetic influence which is more enduring than congelation. In such cases, if desirable to avoid the effects of severe pain, chloroform is preferable; and I do not hesitate to resort to it. But, it will be admited, that an efficient local anæsthetic must maintain a vast pre-eminence over the abolition of human consciousness. If the sufferings accessory to dental practice can be abolished, or even mitigated to an easily endurable extent, without any of the inconveniences and risks of etherization, against which the outcry is so loud, and at which dentists in general are so strangely appalled, the humaner tendencies of our art will be amply satisfied. The substitution, in all available cases of a perfectly harmless congelation, for an anæsthetic which few can inhale without some dread, that in its vapors death may advance with stealthy step, not only meets an almost universal want, but is also in harmony with prudence, reason, justice and humanity.

The following conclusions are fairly deducible from what I have herein advanced:

I. That congelation, by the process I adopt, is efficient for the painless extraction of teeth; or, if not in all cases effecting abso-

lute painlessness, that it so far mitigates the suffering as to deprive the operation of its ordinary repulsiveness.

II. That the peculiar process of congelation, by which this immunity from suffering is accomplished, is itself unattended with pain or inconvenience.

III. That no untoward results accrue from this process of congelation, either local or general. On the contrary, that patients generally enjoy an immunity from the exhaustion usually succeeding tooth-extraction.

IV. That this method is pre-eminently applicable to cases of stumps, the extraction of which is ordinarily so difficult and painful.

V. That the benumbing effect of congelation is often useful in dissipating tooth-ache.

VI. That congelation is infinitely superior to etherization in dental practice, in effecting the same humane purpose with immunity from the natural dread and inconvenience of the loss of consciousness, immunity from alleged possible constitutional effects of chloroform, and immunity from the possible loss of life.

London, 29 New Broad street, City.

NOTE.—It is exceedingly painful to me to feel bound to condescend to personal reflections. But as an apparent claim has been made by Mr. Robinson in the pages of a late number of this Journal, to priority in the use of congelation in dentistry, a few comments may not be considered unreasonable or unjustifiable in the same pages. In the preceding article I have given the history of the introduction of congelation as an anæsthetic into dental practice. How comes it to pass, that Mr. Robinson makes no reference whatever to this history, with which he was well acquainted, both by personal curiosity and by printed records *nearly a year old?* His remarks would lead the readers of this Journal to believe that *he* was the originator of successful anæsthesia by cold in dentistry; and that *he* had contrived original apparatus for that purpose. How far Mr. Robinson can sustain his ground, I gladly leave for the moral sense of the profession to determine. Mr. Robinson adds, "*for general application in dental surgery the new anæsthesia is not at present complete.*" He had applied congelation upon such erroneous principles that, to use his own words, "*the intense pain produced was indescribable.*" As I have detailed, we ourselves at first fell into the same error, but we speedily remedied it, and in doing so, made our anæsthesia *complete.* It was so *completed* last year. Mr. Robinson knew this. How is it he has not advanced his parallel? Mr. Robinson, with a *quasi* liberalism wrote, he tells us, "with a view of enlisting the co-operation of the members of the dental art in America." In doing so he made an appeal to professional skill, high intelligence, and a world-esteemed humanity. But the appeal was so far unnecessary, that the work had long before been completed. Nor does it argue much for the strength

of Mr Robinson's *professional fraternity*, that he feels compelled to seek, three thousand miles away from home, that aid which was ready at his own door. The fact is and it cannot be disguised, Mr. Robinson wrote the article in question with the full knowledge that he was asking aid in a matter where no aid was required. Before a word of that article was penned, the new mode of anæsthesia was in full and perfect operation. Mr. Robinson's partner called at our rooms, spied our apparatus, ascertained the mode of action as he conceived; and the result was, the trials alluded to by Mr. R. at the Royal Free Hospital, &c. Unfortunately for Mr. R., and for his patients who were the subjects of these trials, the most important feature of the apparatus was overlooked; hence, though the outward form was copied, those inward workings remained unknown which would have saved Mr. R. his mistake and his patients their torments. I can readily understand that no man in the dental profession would be more eager than Mr. Robinson to embrace an anæsthetic which obviated the abolition of consciousness, seeing that in his practice, he has, I believe, had an unfortunately fatal case of etherization, but this cannot justify any attempt at the appropriation of other men's inventions without acknowledgment.

Mr. Robinson seems annoyed that any professional man should legally secure to himself the honor which is due to him. I do not wish to enter into the question of the propriety of professional men obtaining patent rights for their discoveries. I would only remark, that, the opproprium, if it be one, rests upon those pirates who are ever ready to prey upon other people's ingenuity, who, themselves deficient in the qualifications of discoverers or inventors, rob the worthy of the honor which is their due. It rests not upon the man who secures himself against their mean depredations. If there were no such pirates, if honor were given where honor is due, if every man had accorded to him by his brother man, the true reward of his thoughts, his inventions, and his toils, society would want no patent laws; at present they are evidently requisite as police to keep down animals of prey.—*Amer. Jour. Dental Science.*

ON THE METAL ALUMINUM.

M. Wöhler having contested the priority of the extraction of the metal alminum from alumina with M. Deville, the latter has replied in a paper before the French Academy urging that the metal he has obtained by sodium and by using new apparatus, differs essentially in the distinctness of its reactions from the aluminum of M. Wöhler. This difference is due to impurities which can not possibly be removed when the operation is made in platina vases: and he asserts that he has ascertained by minute analysis that the aluminum prepared according to M. Wöhler's method contains soda and the platina: now platina raises the point of fusion of the alloy, and the sodium takes from it its most

precious properties: making it subject to the influence of boiling water and the weak acids, while pure aluminum resists them; further imperceptible but pure globules have remained three months in sulphuric acid or weak nitric acid, and have not yet been in the least degree changed, and in boiling nitric acid the dissolution proceeds so slowly that M. Deville was forced to abandon that method of analysis; lastly, if a globule of pure aluminum was dropped on red hot and melted caustic soda, it resisted that energetic agent. The aluminum employed in these experiments (it has been analyzed) was perfectly pure, and it is upon these properties, joined to its inalteration when exposed to the air, that M. Deville grounds his hopes to make it useful. It is also worth attention that while M. Wöhler obtained merely microscopical globules, M. Deville now produces masses of it whose volume is limited only by the quantity of matter employed. He ended this reply by suggesting that other more common metals than aluminum, are perhaps less known than may be thought, and he expressed the hope that when he shall have completed a memoir on the pure metals produced and melted by certain yet secret processes, which he has long been preparing, he shall exhibit some unexpected results. Thus he instanced cobalt and nickel which possess useful physical properties, such as malleability, ductility, developed to a most extraordinary degree; further they enjoy a tenacity far exceeding that of iron, which hitherto has passed as the most tenacious metal; for according to the experiments made by M. Wertheim on these metals, the weights which determine the rupture of wires of iron, cobalt and nickel of the same dimensions, are 60 for iron, 115 for cobalt, and 90 for nickel, which shows the tenacity of cobalt double that of iron; besides, nickel and cobalt are worked at the forge with the same facility as iron, are oxydized less easily than iron, and are susceptible of being employed in the same manner as iron.

The following is an abstract of a report presented to the French Academy on the subject of aluminum and its preparation:—

"The thorough working of aluminum by means of the chloride of this metal and sodium is, by general admission, a great acquisition to science. M. Deville procured chloride of aluminum by causing the chlorine to react on a mixture of alumina and coal-tar, previously calcined. The operation was effected in a gas

retort with extraordinary facility and perfection. The result of M. Deville's observations is, that the action of the chlorine is procured upon a layer of one, or at most two, decimeters of the mixture, so that the absorption of the gas is always complete. The condensation of chloride of aluminum is effected in a chamber of masonry lined with tiles. This chloride is so compact that it can be seen on the table, of considerable density, and composed of yellow crystals. Very slightly ferruginous, it is purified completely during the process of extracting the aluminum, in which its vapor passes over iron filings heated to 400° C. or thereabout. The sesqui-chloride of iron, as volatile as the chloride of aluminum, is changed by contact with the iron, and becomes comparatively very fixed. The vapor of the chloride of aluminum rising from the apparatus forms colorless and very transparent crystals. Sodium is being prepared the meanwhile in large and small vessels with remarkable facility. Having studied with particular care the influence of temperature on the surfaces exposed to heat, and the activity of the vapor of sodium as it escapes from the apparatus, M. Deville is convinced that, by properly regulating the relation between the heated surfaces and the section of tubes from which the sodium issues, one could procure this metal at a moderately high temperature, about that, perhaps, of the melting point of silver. Already even the cylinders are much less heated than are the vessels used in the manufacture of zinc. The author is now employed in producing sodium in continuous apparatus.

"As to the reaction of the chloride of aluminum upon the sodium, that is done in metallic tubes, the form and management of which are not yet sufficiently scientific. In this particular there is yet something deficient. It will be remarked, undoubtedly, that in the details above there is no mention of the very reduced price which Messrs. Dumas and Balard have promised. It appears that, for the present at least, this price is still very high, and very far from being what would be considered the net cost, as stated by us conditionally, of the agents necessary to extract the aluminum. Moreover, M. Dumas has not explained himself formally concerning the price even of the new metal, and he has anticipated too much in this respect. Now, if sodium, which cost lately 1,000 francs a kilogram, should rise 30 francs more,

as it requires three times the quantity of that to extract a proportion of aluminum, it will be perceived that this latter article would not be so accessible as they would have it seem, not to mention other particulars which increase the expense. Still there is reason to believe that a factory of aluminum established at Marseilles, turning to account the chlorine of muriatic acid, which is produced in superabundance, and the aluminum of certain deposits in the vicinity, could offer this precious metal at a price sufficiently low to place it shortly among the more common ones.

"Scarcely has aluminum been ranked among metals before, independently of the unexpected service it will render as such to the arts and sciences, it begins to figure as an electro-chemical agent in a no less remarkable manner. The director of the galvano-plastic department of the Mint, M. Hulot, submitted to the Academy, through M. Dumas, some assays, in which this metal was substituted for platina as an electro-negative element in the piles to a single liquid. M. Hulot has succeeded, not without great difficulty, in rolling perfectly, and without loss, an ingot of aluminum of thirty and some gram's, procured from one of the first meltings of this metal obtained by M. Rousseau—less white than at first, and containing traces of iron and silicium. A connection of aluminum and zinc amalgamated for a long time, charged with water acidulated with a twentieth of sulphuric acid at 66°, disengaged during the first hours considerable hydrogen, and produced a current equal, if not superior, to that of a connection of platina and zinc excited to the same degree. The author asserts that the next day the electro-motive force of the pile was reduced nearly one quarter; but he remarks that it suffices to immerge the aluminum in nitric acid, or still better, as it appears, in sulphuric acid—as it is expedient to effect it at once—to give to the circle its first force.

"As aluminum is nine times lighter than platina, and presents also a surface nine times more extended than the latter metal, with an equal thickness, its substitution for platina should be productive of real advantages, above all now that its price has become very accessible. The aluminum here spoken of is very difficult to forge. In order to roll it, it has been found necessary to anneal it at each pass. By deposing copper electro-chemically

on a plate of aluminum, they have succeeded, by the aid of rollers, in reducing it to very thin plates. Hard aluminum acquires by annealing an inflexibility which would make it of great use in the suspension of all kinds of scales for assays or analysis. This metal is so light that, the weights of the system being the same, the arms of the beam can be elongated a great deal, and long blades can be placed even on the extreme points of suspension, as on the centre of oscillation. The author does not doubt that, in weighing 20 grammes, the sensibility of the balance would not rise a half-millionth."

The price of aluminum, a short time since, in France, was about the rate of gold. M. Dumas, in a recent communication to the Academy, stated that, owing to recent discoveries reducing the expense of extracting it, the cost of production was now about one hundred times less; and M. Balard, another member, stated that there was little doubt that the effect of competition in its manufacture, together with the advantage of throwing it open to the industrial resources of the world, would be to reduce the price as low as five francs the kilogram, or about forty cents a pound.

This important result is mainly attributable to the facility with which we are now able to procure pure sodium in abundance, which is the active agent for the revivication of aluminum, and which was at one time very expensive. M. Dumas observes that the generalization of the procedure of M. Deville, the application of chlorine to the extraction of metals, forms a new era in metallurgy. Among the many remarkable qualities of aluminum, such as its resistance to oxydation, either in the air or by acids, its hardness, its wonderful lightness, its malleableness, the facility of molding it, &c., M. Dumas mentions another—its sonority. An ingot was suspended by a string, and, being lightly struck, emitted the finest tones, such as are obtained only by a combination of the best metals.

CORRESPONDENCE.

LOCAL ANÆSTHESIA.

EDITOR DENTAL RECORDER:

Dear Sir:—Since the issue of the December number of your valuable journal, containing some account of J. Richard Quinton's experience with anæsthesia by congelation, I have labored almost day and night to perfect an apparatus, by which a cold fluid could be successfully applied for the extraction of teeth.

I little thought, when I drew a plan upon paper, that it would require several weeks to get into operation, but, let the requisite amount of time be what it may, it was not ready for use in my hands, with all I could learn from the truly valuable and interesting account referred to, until about the 15th of the present month (Feb.), although I had submitted to what I considered a successful application in my own mouth some weeks sooner.

I have found much difficulty in the preparation of an apparatus that will prevent the flow of fluid in the mouth (and still be applicable to tooth and gum). This having at length been successfully accomplished, I found myself under some embarassment to find some person who was willing to allow me to experiment upon teeth, by extracting them when I thought I had produced the requisite loss of sensation. In this I at length succeeded, by offering a reward to a lady who was once above want, but now obliged to sew for a livelihood, and who was dreading, as well, the expense of artificial teeth, as the removal of a quantity of old stumps and decayed teeth. By this means, I have had ample opportunity to experiment in the patient's mouth, not only upon the anæsthesia, but the improvement of the apparatus.

In the early part of my experiments, I found that something different from an elastic tube, with the flow regulated by stop cocks, was required for general use. Although such an apparatus could, in some cases, be used with an assistant (which, although provided with one myself at present, I have very good reason to suppose dentists are not very generally so fortunate).—

Hence my object has been so to adapt the instrument that it could come into general use, and even be applied by one acquainted, in his own mouth. This I have so nearly accomplished, as to have one ready and now in use by myself, and as soon as I can get the apparatus made in any quantity, I shall be willing to demonstrate the *modus operandi* to the profession should it be desirable. I am convinced, from my own experience, that the principle as laid down by Quinton, is, in fact, applicable in Dental Surgery; but I am not fully convinced as to the specific degree of cold necessary to use. On this point I am still experimenting; the result of my experience, thus far, I would give at this time, were I not prevented from want of time. So far as my experience goes with the use of this new agent, I am highly gratified with the result, as it has placed the matter on this ground, — *that it can be successfully employed by competent hands.* The fluid thus far used by myself was known in my "School-boy days," but I think I have, in some instances, used a colder fluid than necessary; but in this matter much depends upon the mode of application. But as there is *no danger* in experiments, that matter can be easily determined so far as to insure success.

H. L. BURPEE,
35 Fourth-st.,
Brooklyn, E. D.

February 26, 1856.

To THE EDITOR DENTAL RECORDER:

The frequent applications made to me for a minute statement of a system for using the Body and Gum materials I prepare, with "*positive* and *certain* success in *every case*," induces me to place the following before your readers:

In the preparation and combination of the ingredients composing the body, I find it necessary that all should be kept dry until put up (for sale), and although every particle is sifted through a No. 11 bolting cloth, and is made much finer than many suppose necessary, yet it is unfit for use unless ground in water, in small quantities, *twenty-five to thirty minutes.*

The reason for this is simply as follows: two important ingredients composing it are entirely different from the remaining dozen, and each fusing at different degrees of heat from all the

rest, their virtues or properties are lost before the whole is vitrified by fusion upon the piece of work, unless ground in water as before stated.

The grinding in water appears to intermix and combine the whole when baked into one, and an entirely different compound from any of the separate ingredients, or even the final combination, (if not thus ground,) and gives it the solidity and firmness upon the plate and around the teeth, so desirable for good work.

The body should be worked thoroughly between the teeth, and compressed until hard and close as pipe clay. The piece should be moved slowly into the muffle and remain at least *one-half hour*, at a *steady red heat*, after which the heat may be raised to a few degrees above the melting point of pure gold, and the set withdrawn to cool in a close extra muffle.

If baked in a quick or high heat, the surface will glaze, while the inner portion remains but slightly vitrified. If a second coat of body is required, it should be treated as the first.

If possible, nothing, not even the hands, should be brought in contact with the body after it is baked, before applying the gum. A particle of grease or dirt upon it may prevent a perfect reunion.

The gum is always to be used as put up, and should be laid on even, and quite moist, and always left so as to require no carving or trimming except what may be necessery around the necks of the teeth.

If a layer is put over the first, no matter how thin, it is liable to flake up in baking. The same would occur if the gum is pressed or moved after it is first put on. Clock spring spatulas are found most useful in applying it. The piece should be heat up slowly and with care, but fused at a quick heat, *not exceeding four to five minutes.*

The *enamel* for "etched teeth," is to be moistened to the consistence of cream, and applied evenly upon the tooth (thick or thin as required) with a sable hair pencil.

It may be put on at the second baking of the body, or with the gum; its properties being almost entirely equivalent to the latter, minus the color.

Respectfully, &c.,

C. S. PUTNAM,
35 Bond-st.

New-York Dental Recorder;

DEVOTED TO THE THEORY AND PRACTICE OF

Surgical, Medical and Mechanical Dentistry.

Vol. X.] MARCH, 1856. [No. 3.

MEMOIR ON THE LOSS OF THE TEETH.

BY DR. ROSSI, PARIS, 1852.

[TRANSLATED FOR THE RECORDER.]

PREFACE.

A great many books have been written on the Teeth. But few have written earnestly and conscientiously. The greater number in our epoch have had no other aim than to display false erudition, often borrowed or paid for, or what is still more deplorable, to cast their name noisily before the public. As for the last mentioned, their desire to usurp a place among men of merit, is not even an excuse.

It is not our intention to write a bibliographical and critical work; we will quote nobody nor discuss any opinion. We wish to sketch a complete and rational theory, in which the facts are all of equal value, and explain themselves. We do not pretend to have discovered all, or to have invented all. Let those who think they have something to claim, reclaim it.

Our theory is an absolute affirmation, because it is based upon truth.

We will be brief, because we have not twenty varieties of a fantastic disease called *caries*, to describe. It has also appeared to us unneceesary to examine the value of the pathological doctrine of which our venerable member, Doctor Duval, has been a promoter. It begins to lose many of its partisans, and the strong faith in which it was proclaimed in our youth, has already become much enfeebled. Observers of the present day are in a state of doubt, and we now hear eighteen or twenty kinds of caries spoken

of only by some new and courageous compiler, who enumerates, as truths, the speculations of past ages. We esteem the author of *Dentiste de la jeunesse*, without always sharing his opinions.

He may feel consoled, however, even if his doctrines begin to be severely shaken. During a period of forty years, numberless writers have been supplied by him. Books, pamphlets, articles for dictionaries, treatises on Surgery, &c., have copied and re-copied him to satiety. He might often have laid claim to right of authorship, if a juster law had existed.

We do not count upon the same success. Truth is our only support, and we know how importunate it is sometimes. And, finally, certain men, still puffed up by their collegiate pride, consider themselves as *the doctors* of this protean disease, styled *caries*. To descend from this scientific throne requires a denial which is not easy for human weakness to bear. However this may be, we will not be led by this spirit. The spread of truth, even if slow and obstructed in its course, is not less sure, and we have among us honest hearts and noble spirits, who always accept a ray of light, from however humble and lowly the source.

Lastly, a consideration of the utmost importance prompts us. False doctrines often lead to fatal consequences. The means proposed to be employed to overcome the loss of the teeth, flow from the opinions, false or true, which are held upon this subject. It is clearly evident then, how important it is that the truth be known and accepted, in order that error lead no more to injurious operations and to inefficacious treatments.

We shall feel sufficiently rewarded if we have contributed in any measure, however small it may be, toward this desirable result.

PROPOSITION.

ASSERTION.

The change in the teeth, improperly called CARIES, *is a chemical phenomenon, the causes of which are all, and always, apart from life.*

Philosophically expressed, a change in a tissue has an essential and inevitable cause, a modification of nutrition.

In order that this modification of nutrition be possible, the tissue must possess nerves and vessels.

But, the osseous tissue of the teeth receives neither vessels nor nerves.

Therefore the change in the osseous tissue of the teeth, so singularly called CARIES, is not a modification of nutrition, a disease.

In an animal, only organic or inorganic phenomena can take place.

But the change of tissue which occupies our attention, cannot be an orgauic phenomenon, since it does not result from a modification of nutrition.

Therefore, the alteration in the tissue of the teeth, improperly called *caries*, is an inorganic phenomenon, or in other words:

This change is a chemical phenomenon, in which the causes are all and always apart from life, which is the assertion of this proposition.

EXPOSITION.

§ A.—The osseous tissue of teeth is never diseased.

The destruction of the tooth is due to *a single cause* — the action of one or of several acids.

These acids exist,

1st. In the fluids secreted by the subject.

2d. They are produced by elements coming from without, in food, or already formed, directly introduced into the mouth.

Acids secreted by the subject, are found in the buccal mucus, in the saliva and gastric juice. Their quality and quantity depend upon the constitution of the subject, upon a natural though transient state, (pregnancy, lactation,) upon certain diseases to which one may be, for a time, subjected.

The acids produced from elements brought from without, arise from the decomposition of food in every place where it can lodge. This fermentation is putrid or acid. Certain foods furnish more active and concentrated acids than others. Acids introduced into the mouth that are already formed, are generally in drinks or medicines.

§ B.—The decomposition of teeth by acids is considerably favored by predisposing causes, which we will enumerate:

DESTRUCTION OF THE TEETH.

ONE CAUSE.

ONE OR MORE ACIDS.

- Secreted by the subject in
  - The buccal mucus.
  - The saliva.
  - The gastric juice.
- Formed by elements, independent of the subject
  - and resulting from the decomposition of food,
    - putrid substances (meats, etc.)
    - acetic substances (milk, etc.)
  - or existing before their introduction,
    - in certain drinks (cider, etc.)
    - in certain medicines (sulphuric lemonade, etc.)
- Favored by particular conditions (predisposing causes.)
  1st. Quality of the tissue of the teeth.
  2d. Form of the teeth.
  3d. Arrangement of the teeth.
  4th. Traumatic lesions.

1st. By the quality of the tissue of the teeth.
2d. By the form of the teeth.
3d. By the arrangement of the teeth.
4th. By traumatic lesions.

DISEASES OF THE DENTAL PULP and THEIR TREATMENT.

BY CHAPIN A. HARRIS, M. D., D. D. S.

[CONTINUED FROM PAGE 239, VOLUME 8.]

At the request of the Associated Alumni of American Dental Colleges, the writer prepared and read, at their second annual meeting, a paper on the diseases of the dental pulp. This paper was published in the April and July Nos. vol. 4, New Series, of the Journal, but as only two of the pathological conditions of the organ, *irritation* and *inflammation*, were noticed, he intended to resume, at some future period, the consideration of the subject, but arduous professional and other duties have hitherto prevented him from doing so. At the conclusion of the paper, a few remarks were offered on chronic inflammation, and a brief notice of the method of procedure pursued by Drs. W. W. Codman, of Boston, and W. H. Dwinelle, of Cazenovia, N. Y., in the treatment of exposed dental pulp. A few additional remarks upon this part of the subject will now first claim the consideration of the writer.

When the pulp of a tooth becomes exposed, it is very liable, as stated in a preceding part of this paper, to become the seat of chronic inflammation, and when this happens the exposed diseased surface pours out serous fluid, rendering the operation of filling, during the continuance of the morbid action, impracticable, as the accumulation of fluid between the filling and the pulp would become an additional source of irritation and soon give rise to a more active form of inflammation. If, therefore, we would preserve the vitality of the tooth, our attention must first be directed to the restoration of the pulp to a healthy condition. This accomplished, the cavity may be filled with a fair prospect of success, but in doing this, care must be taken not to wound the exposed delicate, and, under all circumstances, highly sensitive organ.

Creosote and the essential oils of cloves, cinnamon and cajuput, from their pungent and stimulating properties, have long been held in high repute as odontalgic remedies, but the writer has seldom derived much benefit from them in the treatment of chronic inflammation of the pulp. The application of them, it is true,

is often followed by an immediate and complete subsidence of the pain occasioned as a consequence of it, but the diseased action is seldom removed by their use. Dr. Dwinelle recomends, in cases of this kind, the direct application of tannate of lead, and, in two or three cases, the writer has used it with complete success. Still, he has not employed it in a sufficient number of cases to enable him to speak very decidedly with regard to its merits, having failed oftener than he has succeeded, in attaining the object proposed by its use. A saturated solution of tanic acid in spirits of wine with a sufficient quantity of gum benzoin dissolved in it, to make it of the consistence of thick mucilage, applied on a little raw cotton, has been attended with more satisfactory results in the practice of the writer than tannate of lead.* A two-fold benefit is often obtained by the use of this preperation; for, while the stimulating properties of the alcohol have a tendency to allay pain, the astringent effect exerted by the tannin promotes resolution of the exposed inflamed surface of the pulp. Of the several cases successfully treated with it, it may not be amiss to give a brief history of one or two.

Mr. E., a young gentleman about twenty one-years of age, of a sanguino-nervous temperament, applied to the writer in the early part of the summer of 1854, for professional advice in relation to his left second upper bicuspis. It was decayed in its posterior approximal surface, and some eight or ten months before, the decomposed portion had been removed with a view to having it filled, but as the pulp was found to be considerably exposed, the operation was deemed impracticable. The first molar being in a carious condition and the anterior half broken off, the cavity in the bicuspid was completely exposed to view. As the young gentleman refused to submit to the loss of the tooth, it had been permitted to remain in this condition, though it had subsequently, several times ached, and occasioned considerable annoyance. The pain, however, was usually readily allayed by the application of stimulants, and hence the organ had been permitted to remain in his mouth.

* The use of this preparation of tannic acid was recommended to the writer a few years since by Dr. F. H. Badger, of Nashville, Tenn., but not as a remedy for chronic inflammation of the pulp of the tooth.

After removing some foreign matter which had accumulated in the cavity of the tooth, the exposed part of the pulp could be readily seen. It protruded slightly into the external cavity, presenting a thickened and inflamed appearance. Regardiug the constitutional temperament of the patient as unfavorable for the retention of a tooth after the destruction of its vitality, the writer determined to attempt to subdue the inflammation, and fill the tooth over the exposed pulp. With a view to which, he filled the cavity with raw cotton, saturated with the solution of tannin and benzoin, renewing the application every eight or ten days. At the expiration of four or five weeks, the exposed portion of the pulp assumed a healthy appearance, and had receded back into the central cavity. The tooth was now filled with Hill's stopping, leaving a small vacant space between the pulp and bottom of the filling, intending ultimately to replace it with gold. In three or four days Mr. E. returned, complaining of pain in the tooth. Supposing it to be occasioned by pressure of accumulated fluid at the bottom of the cavity, the Hill's stopping was removed and the solution applied as before. This treatment was continued several weeks longer, when the tooth was again filled with the preparation used in the first instance, and the patient requested to return immediately, if pain should a second time be experienced, and if it gave him no inconvenience, at the expiration of five or six months. As nearly as the writer can recollect, about nine months elapsed before he again saw him, and as the tooth had given no furter trouble, and the filling still remained perfect, he was directed to leave it six or eight months longer, when the writer proposed to remove it and fill the tooth properly with gold. His object in delaying the operation so long, was to give ample time for the formation of a solid protective covering over the exposed part of the pulp. The patient not having yet returned for the replacement of the temporary with a permanent filling, the treatment may be regarded as successful.

Miss W., a young lady about twenty years of age, of a sanguino-bilious temperament and good constitutional health, applied to the writer in the winter of 1854, for his professional services. Several of her teeth were slightly affected with caries, and in one, the first right inferior molar, the disease had penetrated from the

anterior approximal surface to the pulp-cavity. This tooth had ached several times, and though the exposed part of the pulp had become the seat of chronic inflammation and was aching at the time, as she was unwilling to lose the tooth, he applied to it, after having first removed all the decomposed dentine, the solution of tannin and benzoin, in the manner as described in the foregoing case, but as the pain was increased by the application, it was removed, and creosote substituted, closing the orifice of the cavity with yellow wax. The pain now subsided almost immediately, and there was no return of it the following day, the cotton on which the creosote was applied was removed, and the cavity filled with another piece saturated with the solution of tannin. This application was renewed every few days for three weeks. The exposed pulp having by this time assumed a healthy appearance, a gold filling was at once introduced. The tooth, when the writer last saw the young lady, more than twelve months after the operation had been performed, had given her no trouble and was as useful as any of her other teeth.

In the use of tannin in the form here described, there is no necessity for closing the orifice of the cavity with wax to exclude the secretions of the mouth, as the fibres of the cotton, as the alcohol evaporates or is diluted with the saliva, become agglutinated to each other by the benzoin. It answers the same purpose as gutta percha in chloroform.

In describing the successful results which have attended the use of the preparation last noticed in the treatment of chronic inflammation of the dental pulp, it is proper to state, that it has not proved thus efficacious in all the cases in which it has been employed by the writer. It has failed to accomplish the object proposed in a majority of the cases in which he has used it. Still, the beneficial effects which have resulted from its employment, entitle it to a place among the remedial agents resorted to in the treatment of the affection under consideration.

But the first step to be taken in the treatment of chronic inflammation of the pulp, as intimated in a preceding part of this paper, is to free the cavity in the tooth of all accumulations of extraneous matter and decomposed portions which can act as irritants, or aggravate the already existing disease. This done it

may be carefully washed out with tepid water and the remedial agent applied as previously directed. The success of the treatment too, will depend greatly upon the state of the general constitutional health of the patient at the time. An irritable condition of the system or derangement of the digestive organs will, in a majority of cases, render unavailing the most judicious and skillful treatment that can be adopted.

Dr. Koecker regards the preservation of a tooth as practicable, so long as the pulp is not actually in a state of suppuration or deprived of vitality, and he expresses the belief that as many as five out of every six cases, in which caries has penetrated to the lining membrane, may be preserved alive, and it is evident from the description which he gives of some of the cases he treated, that the pulp was in a state of chronic inflammation at the time. The method of procedure which he recommends consists in first cauterizing the exposed surface with a red hot wire, using the precaution not to touch any part of the surrounding dentinal walls or to wound the lining membrane; the exposed pulp is then covered with a plate of thin leaf lead, with the edges resting upon the surrounding solid parts, and the cavity filled with gold in the usual manner. In the commencement of his practice, Dr. K. states that he was in the habit of using tin foil, but as he was seldom successful he was induced to substitute lead, believing that the last named metal exerted a "cooling and anti-inflammatory effect upon the irritated nerve of the tooth." Having never adopted this treatment in chronic inflammation of the pulp, the writer is unable to speak from experience, of its relative success as compared with the method of procedure which he has pursued in similar cases.

A solution of sulphate of zinc in rose water, in the proportion of from six to eight grains of the former to an ounce of the latter with thirty-five or forty drops of laudanum, may sometimes be employed with advantage when the tooth is free from pain. It acts as a cooling astringent, producing a very pleasant effect.—The cavity in the tooth, however, should be first properly prepared. It is applied like most other remedial agents on a little raw cotton, sealing up the orifice with wax or mastic to exclude the secretions of the mouth. It causes for a few minutes, when

first applied, a slight burning sensation, but this very soon subsides, leaving the tooth entirely free from pain. It should be applied once a day until the desired effect is produced, and in closing the orifice of the cavity care must be taken not to press upon the exposed pulp, as the irritation which would be thus produced would counteract the beneficial effects of the preparation. This may always be prevented by placing a cap of tin foil over the dossil of cotton before the orifice is closed.

Ulceration.—It is seldom that the pulp of a tooth can be restored to health after it has become the seat of ulceration. The difficulty of applying to it suitable remedial agents and protecting it from the action of irritants, such as particles of foreign matter and the secretions of the mouth, increases the difficulty with which the practitioner has to contend, and very often renders unsuccessful, remedies, which, under other circumstances, might produce the desired effect. Still, ulceration, even of this most exquisitely sensitive tissue, is sometimes cured, and when the preservation of the tooth is called for by some peculiar or urgent necessity, every resource of the dentist should be called into requisition for the accomplishment of the object.

The treatment usually adopted in cases of this kind consists in the application of escharotics to the ulcerated surface of the pulp. Nitrate of silver has sometimes been successfully employed. It is used in a diluted state, in the proportion of from six to ten grains to an ounce of distilled water. It should be applied every day until the ulcer is healed, and the cavity in the tooth, after each application, carefully closed to exclude all extraneous matter. The tooth, too, previously to commencing the use of it, should be freed from all decomposed portions of dentine. Chloride of zinc, has also been used with advantage, but it is less efficient than nitrate of silver.

The application of the actual cautery, as recommended by Dr. Koecker, may, perhaps, after all, be better calculated to bring about a favorable result than any other remedial agent, but it must be very carefully and skillfully applied, to prevent wounding the pulp or touching any other part than the ulcer itself.—The dentist having determined to apply it, should first prepare the cavity in the tooth by the removal of all decomposed por-

tions of dentine, and being now provided with a lighted tallow candle, he holds in the flame of it the point of an iron wire, until it attains a red heat, then applies it, for an instant only, directly to the ulcer. If this is followed by any bleeding, it is touched a second, and if necessary, a third time, in quick succession. This done, the cavity in the tooth is made perfectly dry, a small piece of leaf lead placed over the bottom and the filling immediately introduced. This method of treatment, according to Dr. Koecker, proved eminently successful in his hands. The writer, however, has never tried it. Indeed, until within the last three or four years, he doubted the practicability of preserving the vitality of the tooth after ulceration of the pulp had taken place, but having been convinced that it can sometimes be done, he no longer doubts the truth of Dr. Koecker's statement. But the use of the actual cautery can only be resorted to in those cases where the diseased surface of the pulp is easy of access.

Should the foregoing methods of treatment fail to restore the pulp to a healthy condition, the vitality of it may be destroyed, either by the application of arsenious acid, or direct extirpation, if the preservation of the tooth be deemed a matter of sufficient importance, and as this often becomes necessary, a brief description of the manner of doing it, and the subsequent treatment may now very properly be given.

Destroying and Extirpating the Pulp, and Filling the Root.—Immediate extirpation of the pulp is attended with more pain than the destruction of its vitality with arsenic, and is seldom resorted to in a tooth having more than one root. It is effected by thrusting a very delicate untempered spear pointed steel instrument into the nerve cavity to the extremity of the root, then it is severed by a few rotary motions, and if not brought away in the withdrawal of the instrument, may be removed with another having several sharp barbs cut upon it near the point. Some dentists think this method preferable to the other, and better calculated to secure the subsequent preservation of the tooth, but others who have practiced both, deny that the former possesses any advantages whatever over the latter. It is supposed by some that the effects of the arsenious acid extend to the peridental membrane, impairing, if not destroying, its vitality and rendering the

tooth obnoxious to the parts within which it is implanted. But this effect can only be produced by a larger quantity, and permitting it to remain longer in the tooth than is necessary to accomplish the object proposed by its employment.

When the pulp is destroyed by direct extirpation, the tooth may be filled immediately or as soon as the oozing of blood from the mouths of the wounded vessels at the extremity of the root ceases; the effusion of lymph which takes place during the curative process is seldom sufficient to cause irritation.

In destroying the pulp with arsenious acid it is not necessary to use a very large quantity; the thirtieth part of a grain is amply sufficient, combined with an equal quantity of sulphate of morphia. For convenience, have a grain of each thoroughly incorporated, by grinding in a small mortar, then divided into thirty equal parts, and each put up in a small piece of paper and kept ready for use. One of these is applied on a dossil of raw cotton, moistened with creosote, or oil of cloves or cajuput, and applied directly to the exposed part of the pulp. Over this, a small cap of lead or tin is placed, and the cavity in the tooth filled with wax or Hill's stopping, to exclude the buccal secretions and prevent the arsenic from escaping into the mouth. The advantage derived from placing a cap of lead or tin over the arsenic is the prevention of pressure on the pulp in filling the cavity with wax, and the consequent freedom from pain during the destruction of its vitality. When this is done, the tooth rarely aches during the action of the arsenic. With proper care the cavity may, in nineteen cases out of every twenty, be filled with wax or any other plastic substance, when the application of a protective covering to the pulp is omitted, but by using such precaution the liability of it is prevented, and the trouble of applying it is so trifling that it should always be done, at least, by the inexperienced practitioner.

At the expiration of from six to ten hours, the arsenic may be removed and the cavity washed with tepid water. This done, the opening into the central chamber of the tooth is enlarged by cutting away the solid dentine, with instruments properly adapted to the purpose, and when practicable, without wounding the dead pulp, which may, afterwards, in many cases, be brought away

almost entire. Every particle of it, however, should be removed to the very extremity of the root or roots, if the tooth have more than one. With a view to which, untempered steel instruments with barbed points, and sufficiently small to traverse the canal in the root, are introduced and withdrawn several times or until the operator is absolutely certain that no portion of the disorganized pulp remains. This part of the operation is sometimes exceedingly difficult, requiring the patient exercise of no little ingenuity and skill, especially when the tooth is a bicuspid or molar, having two or more roots, and the opening through the crown in the posterior approximal surface. Indeed, it cannot always be done without first filing away one-fourth or one-third of the crown, and increasing the size of the external opening.

In a lower molar the anterior and posterior walls of the canal in the roots, almost meet in the centre, leaving a very delicate opening or canal on each side, from both of which, the elongated pulp is to be carefully removed. This, also, is sometimes the case in a bicuspid, so that instruments, not larger than a small bristle are often required. When the root is bent or curved, the difficulty of traversing it to its extremity, is, of course, very greatly increased. The canal in the buccal root of an upper molar is not unfrequently so small that it cannot be penetrated through its entire length, even by the most delicate instrument that can be made. In this case the dentist must be content with the removal of as much of the hair-like elongation of the pulp passing through it as he can bring away, and, fortunately, any portion which may afterwards remain is too small to be productive of serious injury.

The arsenic should never be permitted to remain in the tooth longer than from ten to sixteen hours, and in most cases from six to seven will suffice for the complete destruction of the vitality of the pulp, and when placed directly upon it, a second application rarely if ever becomes necessary.

There is almost always, after the removal of the pulp, a slight oozing of blood from the mouths of the severed vessels at the extremity of the root. This sometimes continues for two or three days. It is, therefore, necessary to delay the subsequent operation of filling, as has been alseady intimated, until it ceases. The blood which at first escapes does not coagulate, but as the vessels

at the apex of the root recover from the effects of the arsenic and acquire a healthy tone, their extremities soon cicatrize.

The oozing of blood having ceased, the pulp cavity may be syringed out with water and then dried with prepared raw cotton, but the most convenient way of introducing this into the root,* is to wind a small quantity on a probe small enough to penetrate readily to its apex, and made rough to prevent the cotton slipping off when the instrument is withdrawn. This done, the operation of filling may be commenced, but in introducing the gold, different practitioners have adopted different methods of procedure. Some adopt the method proposed by Dr. Maynard, of introducing very thick foil, say No. 15, 20 or 30, cut in strips not wider than the diameter of the smallest part of the canal in the root; others use it rolled into small cylinders as recommended by Dr. F. H. Badger, and others again prefer to introduce it in the form of small pellets. But whatever be the form in which it is used, it is necessary to consolidate it sufficiently to render it impermeable to fluids. When narrow strips are used, the end of one is placed upon the point of an untempered steel filling instrument, of the proper size, and carefully carried to the apex of the root. The instrument is now withdrawn a short distance and again returned, carrying with it another fold, and this is repeated until the entire strip has been introduced, compacting each successive fold as firmly as the instrument will permit. Thus, strip after strip is introduced until the canal is filled. If the tooth has more than one root, the filling of the others may be deferred until a future sitting of the patient. A sitting may be alloted to the filling of each root, or all may be filled at one time. But in filling the roots and pulp cavity of a molar, two or three sittings are sometimes necessary, and having completed these several parts of the operation, the cavity in the crown is filled in the usual manner. The most skillful manipulation is required in every part of the operation, especially when the tooth has more than one root.

When the gold is used in the form of a cylindrical cone, a piece is cut from the leaf, of a triangular shape, and rolled as compact-

* Cotton used for drying cavities in teeth preparatory to filling should have the oil removed from it by boiling a few minutes in a tolerably strong solution of carbonate of soda, or some other alkali, to make it absorb moisture freely.

ly as possible, using the precaution not to make it too large to prevent it from being easily introduced to the extremity of the root, nor the point so sharp and small as to admit of its being carried above the apex of the fang, as in that case, it will act as an irritant to the periosteal tissues of the alveolus. When there is danger of this, the point should be clipt off with a pair of scissors before it is introduced into the root. The gold being thus prepared, an untempered stilet is introduced to the point intended to be reached by the filling, and the length of the canal indicated by bending the instrument at the commencement or mouth of the canal. The length is then marked on the cylinder of gold. This done, it is carried up to the designated point, then an untempered steel instrument, having a point shaped like the cylinder of gold, but a little smaller, is forced up between it and the root, compressing the former as much as the strength of the instrument will permit. Having proceeded thus far, another cylinder of gold is introduced, and this process is repeated until the cavity is compactly filled. The root, or roots, if the tooth has more than one, being filled, the operation is completed by filling the pulp and crown cavities in the usual manner.

The third and last method to be noticed, consists in cutting the gold into small square pieces, varying in size from a twelfth to a sixth or fourth part of an inch, depending on the thickness of the leaf and the size of the canal to be filled. These are carried up to their place in the root, one at a time, beginning with the smallest, on the point of a suitable instrument. Each one is compressed as much as the strength of the instrument will permit, as it is introduced.

The relative merits of these several methods of procedure depend very greatly upon the perfection in which each is practiced. The root of a tooth may be very compactly filled by either, but to do it, requires, as already intimated, much time, and the nicest skill in the management and working of the gold, especially when the canal is very small and difficult of access.

The operation is less likely to be successful when performed on the tooth of a person previously to the sixteenth or eighteenth year of age than at a later period, and for the reason that the canal in the root is, up to this time of life, much larger than after eighteenth or twentieth year of age, especially the opening at the

extremity of the root. Hence, the root itself, after the destruction of the pulp, is more liable to act as an irritant, and there is greater danger of forcing the gold through it into the socket at its apex, no matter what may be the method in which it is used. An accident of this kind will defeat the success of the operation and render the extraction of the tooth necessary. To prevent which, when the canal is large, the length of it should always be ascertained in the manner as before directed, previously to introducing the gold; by using this precaution, it may be prevented.

In filling the root of a lower molar, when it becomes necessary to introduce two fillings in consequence of the approximation of the walls of the central part of the opening throughout its whole length, leaving only a very small canal on each side, the operation, very often, may be facilitated and rendered more perfect, by enlarging them with a watchmaker's broach. The same may also be done with the bicuspids under similar circumstances, and sometimes with the buccal roots of the upper molars. Indeed, the canal of the root of any tooth may be enlarged in this way when necessary and easy of access.

The foregoing brief directions, intended only for the inexperienced practitioner, will, the writer trusts, be found sufficient to guide him in the performance of the operation, but cases will occasionally come up in practice where the ingenuity of the operator alone will have to determine the method of procedure most proper to be pursued.

Fungous Growth.—There is sometimes developed from the pulp of a tooth, after it has become exposed, and been in a state of chronic inflammation or ulceration for a greater or less length of time, a morbid growth, which assumes the form of a small vascular tumor of about the size of a duck-shot or elderberry, and as sensitive to the touch as the pulp when in a healthy state. It rarely grows very rapidly, and never attains a very large size. It always proceeds from the exposed parts of the pulp and is preceded, usually, for several weeks by chronic inflammation or ulceration. The proper remedial indication consists, in the majority of cases, in the extraction of the tooth, though the fungous growth, it is probable, when wholly confined to the pulp, may sometimes be repressed by the application of escharotics or the actual cautery. The disease, however, is usually regarded as incurable.

It often happens that the central cavity of a tooth, after it has become exposed by the decay of the crown, is occupied by a morbid growth, which has originated from the periosteum of the root or gum, the caries having extended through the neck of the organ. Through this opening the fungous growth finds its way into the tooth, filling in a short time both the central and crown cavities. Tumors of this kind are frequently mistaken for a morbid growth of the pulp. They usually grow very rapidly, and sometimes attain a very large size. They are also very vascular and bleed freely when wounded. The writer has frequently met with tumors of this sort which had their origin in the alveo-dental periosteum at the extremity of the root, the morbid growth having made its way through the enlarged canal into the crown. It is scarcely necessary to say, that fungous productions of this character can only be cured by the extraction of the tooth, inasmuch as they are always soon reproduced after removal. The teeth, too, in which they are met with are usually so much decayed as to preclude the possibility of their preservation.

[TO BE CONTINUED.]

DYNAMOMETER.

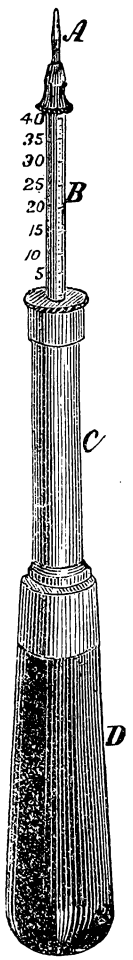
The instrument which we have been using for the purpose of experimenting on the subject of the condensation of gold foil and crystal gold, is made by extending a beam or shaft through a common spring balance of the stores, which draws fifty pounds. This shaft is fastened to the spring instead of the wire, which is used in these balances. The shaft is left extended above the plate of the instrument sufficiently to allow of free motion, and on the upper extremity there is a small vice firmly attached, and into which a small iron ingot can be fastened at pleasure. This shaft is held in its position, when pressure is made, by a plate through which it passes at either end of the scale-plate of this common balance, and instead of its being pulled at, as in weighing articles by the shopkeeper, it is pushed upon from the utter extremity, and, of course, registers the weight on the old scale-plate; the difference is, therefore, only between pushing and pulling. Near the ingot is placed a graduating rest for the thumb or finger of the operator, so that he can operate on

the ingot, and imitate nearly all the positions assumed while operating on the mouth—thus testing very well the amount of force he is capable of exerting in those different attitudes of the hand, except that he can effect much more pressure on the instrument than upon the mouth, which we will hereafter show. It is believed by many operators that as much force can be applied in plugging teeth with the instrument held between the fingers as if it be grasped in the hand. This is not so. The greatest amount that we can apply on the dynamometer, with the instrument in the fingers, is from twelve to eighteen pounds; while, if we grasp the instrument in the hand, and let the end of the handle rest against the palm, near the wrist, we can, with much less bodily effort, exert fifty pounds, and this relative proportion is kept up when operating on the mouth. It is true that a good plug can be made by using the instrument in that way, but it is at a much greater expenditure of labor and time than if the instrument be larger and held in the hand. In operating upon the lateral surfaces of teeth, there is seldom a greater force exerted than from five to ten pounds; that is, direct forward force. The amount of force lost by the yielding character of the parts operated upon, and lateral support given to the instrument in precaution against slipping, has never been estimated by the operator as lost; in other words, the great efforts of the operator are so distributed as to deceive him as to the amount transmitted to the condensing point of the instrument. The many complaints of the broken-down dentists, after a few years' constant and hard operating, and the weeks, and even months, of relaxation taken by some of them in warm weather, makes this a matter worthy of serious reflection by every member of the profession. A certain amount of pressure is absolutely essential for condensing gold, and must be employed by one as well as the other; and if only five pounds is effected by the one, and ten by the other, it counts in time against the one only employing five; and again, a plug that is made with a five or ten pounds pressure, and feels to be condensed under the operator's instrument, will very readily be crushed by a greater pressure with an instrument with the same condensing surface. The great length of time consumed in properly condensing a plug with a small instrument, and used under disadvantage, makes the operation of plugging a tooth too expensive to be within the reach of many persons to pay; besides, it limits the operator to a very few operations per day.

The dentist should learn, as one of the most important features in his *skill* in plugging teeth, to operate from the shoulder, and the instrument grasped full in the hand, as all the strength used to hold on to it, to pre-

vent it slipping through his fingers, is lost to its condensing point and to the shoulder. We know a number of operators who fully appreciate the necessity of a proper condensation of a plug, but exhaust their strength in doing it. This should not be. We have also another instrument for testing the amount of pressure that is usually made in operating on the mouth, and which can be applied to crown cavities in the superior molars. It is about nine inches long, and can be understood by referring to the accompanying cut, which is reduced to about half size.

A is the condensing point or bit, in a socket, so that any size may be used. *B* is the shaft, and on which the scale is marked, to register the amount of force applied to the instrument. *C* is a hollow cylinder in which the spring is contained. When the extremity of the shaft *B* is depressed, the opposite extremity runs into the handle *D*, which is hollow to receive it. It is with this instrument that we have corrected the very erroneous idea we entertained heretofore with regard to the amount of direct pressure we supposed we were in the habit of exerting upon a plug in the mouth, as well as the amount of pressure different patients and teeth can bear. It is a difficult matter for us to apply more than ten or twelve pounds of pressure on a superior molar of a patient of that many years of age, or a nervous and yielding patient. We never used two hundred pounds and over, in these delicate cases; but when we have an older patient, or a hard head and stiff neck, and a molar well set in a well developed jaw, and the patient firmly seated in the chair, we can apply as much as twenty-five, and even in some cases thirty pounds: this we venture when the plug is nearly done, otherwise we would fear thrusting the plugger through the tooth. A friend of ours said he thought he was in the habit of applying from sixty to eighty pounds pressure. We sent him the instrument; he applied it to a plug in the crown of a superior molar, and at twenty-five pounds the point of the instrument penetrated the plug, as he said, about the thirtieth of an inch. In experimenting on plugs out of the mouth, in teeth that we have extracted, we have not found any plugs that would bear thirty pounds, very few more than fifteen, some not ten; in fact, every plug that we have tried were at best mere sponges, comparatively. Many of those plugs, when made and dry,



would doubtless have borne a much greater pressure without giving way, but such is the influence of moisture, or something else, that they are easily penetrated by the instrument after they are worn some time. It is extremely exhausting for an operator to keep up a prolonged pressure of from fifteen to twenty pounds upon a crown plug of a molar tooth. We will continue our article in the next News Letter, and especially on the *cylindrically* prepared gold. J. D. W.

EDITORIAL.

AMALGAM.—During our recent trip to Philadelphia, we learned that the new Amalgam is gaining ground among the profession in that city, and thus far with very *promising* success. A number of gentlemen with whom I conversed stated that no instance of discoloration had been noticed in their practice, nor had they heard of any such unpleasant result. One gentleman, hitherto an earnest opponent of all mercurial preparations, advised us not to use it, or even to experiment with it, for if we did, we would certainly not know where to stop. He began by opposing, continued by experimenting, and has ended by adopting it in his practice. We shall not follow his advice, preferring to satisfy ourself as to its merits or demerits by actual and practical experiments *out of the mouth.* In fact, we have been doing this for some months, and when we have progressed sufficiently to be able to uphold or denounce it, and sustain our position by actual facts, we shall not hesitate to do so. We are aware that many of our professional brethren are making investigations in this direction. When they have satisfied themselves in regard to the new amalgam, we shall take pleasure in opening the pages of the Recorder to those who may desire to adopt such a method of making the profession acquainted with their conclusions. It is nearly six months since Hunter's Amalgam made its first public appearance. But nobody has heard anything of Dr. H.; he keeps wonderfully quiet, considering the circumstances. His experience, if made public, would probably aid materially all who are experimenting—might settle the question in the minds of many who are now wavering, and certainly could not, in our opinion, be productive of harm. We suppose Dr. H. intends to make himself heard in time. We think the sooner that time comes the better.

ALUMINUM.—Quite a number of our correspondents have made inquiries relative to this metal. As a sort of general answer, we furnish in this number an article from the "Annual of Scientific Discovery," which will be found to contain some very

interesting information. By the new method of procuring the metal, its cost is *expected* to be much reduced—some say even as low as forty cents per pound, which will be quite a reduction upon the price asked by a party in this city—said price being the moderate sum of 12½ cents per grain, or seven hundred and twenty dollars per pound.

We are indebted to Messrs. Chas. Abbey & Sons, of Philadelphia, for some foil made from aluminum; it is surprisingly light, seems to possess no welding properties, and for filling cavities in teeth we should pronounce it inferior to tin foil, which in appearance it slightly resembles, though having a more silvery hue. It melts at a low temperature, and as it is not readily affected by most of the acids as the baser metals, it has been thought likely to answer for many purposes in the arts and sciences, instead of some of the more precious ones now in general use. Of course, its general adaptation for general uses will depend much upon the cost of procuring it. We are inclined to doubt its utility in the mechanical branches of our art, except as an alloy for more costly metals. We think it quite likely that it may be used to advantage in solder, and thus enable us to dispense with some of the more oxydizable metals now in use. Pure aluminum will not unite with mercury. Whether it can be so alloyed as to make a hard and solid amalgam, remains to be seen. We attempted to make an amalgum of aluminum, tin and mercury, and thought we were on the high road to success; but while forcing out the extra mercury, by squeezing the half amalgamated mass, (it did not amalgamate kindly,) it became so hot that we had to drop it; and as our stock on hand was too minute to be trifled with, or to allow us to waste any, we thought our experiments in this direction had better be suspended. We hope more fortunate results await those who may begin where we left off.

Anæsthesia by Congelation.—This is another topic of general interest to the profession. Quite a number are experimenting, and several claim success. An article from Dr. Burpee, to be found in the present number, gives his opinion of the results of his labor. Dr. Branch, we believe, of Galena, was one of the first, if not the first, in this country to advocate its merits and applicability to dental practice. His apparatus for administering was considered too expensive. Dr. Burpee hopes to produce something quite inexpensive. When we see it, we can say more of it. We advise experimenters to be on their guard—somebody's *ideas* may be congealed by the *mis*-application of a freezing mixture—and the danger of paralyzing the muscles of the face, jaw and pharynx may be greater than has been imagined. A paralysis of the pharynxeal muscles, even if very slight and not long continued, might be productive of very serious consequences.

Dental Colleges.—The commencement of the Baltimore College of Dental Surgery was held on the 4th of March, and the commencement of the Philadelphia College on the 27th day of February. Owing to a misunderstanding relative to the dates,

we were unable to be present at the former. The latter we attended. We give below the list of matriculants and graduates. The valedictory address was delivered by Prof. Flagg. The address was a good one, of course, truthful and practical in its nature, and its delivery was marked by an entire absence of that boisterous eloquence which is so out of place upon such occasions.

The names of the Students of the past Session are as follows:—

MATRICULANTS.

SESSION 1855–6.

A. F. McLain,	Louisiana.	Samuel H. Ladd,	New Jersey.
John Lavery,	Philadelphia.	John W. Hunter,	N. Carolina.
James P. Broun,	Virginia.	Henry Winterbottom,	Pennsylvania.
Antonio L. Coopat,	Cuba.	James K. Whiteside,	"
Jose G. Lopez,	Porto Rico.	James E. Garrettson,	"
R. Woodward Robinson,	New York.	J. Foster Flagg,	"
Charles E. Hopkins,	New Jersey.	J. Canning Allen, Jr.,	"
Whilldin M. Foster,	"	W. Bartling Robbins,	"
William Grimes,	Indiana.	Geo. W. Wemmer,	"
Edmund Stevens,	Maryland.	James B. Candy,	"
Irving A. Patterson,*	N. Carolina.	T. F. Coryell,	"
Francis Field,	Massachusetts.	J. G. Ellison,	"
Edwin L. Cowan,	New Jersey.	George W. Mifflin,	"
Jno. P. O'Daniel,	Delaware.	Wm. McLenegan,	"
Charles H. Burr,	Maine.	John Watkins,	"
Nicholas Corson,	New Jersey.	Wm. B. Dixon,	"
Tomas Gonzalo Borjes,	Cuba.	H. B. Parry,	"
John Z. Stanger,	New Jersey.	Robert McLellan,	"
Wm. H. Allen,	S. Carolina.	Charles Neil, M. D.,	"
Louis Martin y De Castro,	Porto Rico.	Alan W. Read,	"
Wm. T. Arrington,	Tennessee.	F. A. Ware,	"
Samuel Martin,	N. Carolina.	Benjamin J. B. Davis, M. D.,	"

* Deceased.

GRADUATES.

The degree of Doctor of Dental Surgery was then conferred upon the following named gentlemen. After which the Valedictory was delivered by Prof. Flagg.

J. Canning Allen, Jr.....Philadelphia, Pennsylvania.
Wm. T. Arringeon.....Dresden, Tennessee.
James P. Broun.....Heathsville, Virginia.
Charles H. Burr.....Portland, Maine.
Louis Martin y De Castro.....Porto Rico.
Antonio L. Coopat.....Havana, Cuba.
Francis Field.....Waltham, Massachusetts.
J. Foster Flagg.....Philadelphia, Pennsylvania.
James E. Garrettson..... " "

WILLIAM GRIMES.....Richmond, Indiana.
JOHN W. HUNTER.....Salem, North Carolina.
JOSE G. LOPEZ.....Aguadilla, Porto Rico.
SAMUEL MARTIN, M. D.....Salem, North Carolina.
A. F. McLAIN.....Franklin, Louisiana.
ROBERT L. McCLELLAN.....Cochransville, Pennsylvania.
CHARLES NEIL, M. D.....Philadelphia, "
HENRY B. PARRY.....Lancaster, "
ALAN W. READ.....Norristown, "
W. BARTLING ROBBINS.....Philadelphia, "
R. WOODWARD ROBINSON.....New York City, New York.
JOHN Z. STANGER.....Glassboro', New Jersey.
JAMES K. WHITESIDE.....Cochransville, Pennsylvania.

The following is a record of the operations performed in the Infirmary:—

DEMONSTRATORS' REPORTS.

SESSION 1855-6.

OPERATIVE DEPARTMENT.

Fillings	562
Treatment of "Nerve," (cases)	84
Extraction of Teeth and Roots	723
Superficial Caries	2
Removal of Salivary Calculus, (cases)	27
Pivot Teeth Set	7
Total operations	1405

LOUIS JACK, *Demonstrator.*

MECHANICAL DEPARTMENT.

Entire Sets of Teeth	3
Partial Sets	16
Total of Teeth inserted	163

W. CALVERT, *Demonstrator.*

R. ARTHUR, DEAN OF THE FACULTY.

It will at once be seen that in Dental Colleges Students have opportunities of witnessing and performing many more practical operations on the teeth, in the course of a few weeks, than they could possibly hope to meet with by remaining years with the most competent teacher, even were he backed by the most complaisant of patients.

During the commencement exercises, an incident occurred that struck us as being something novel in the history of Dental Surgery.

The President (we presume) of the Board of Trustees or Corporators read the authority for conferring the degrees, and handed the diplomas to the Graduates. After they had all been conferred, and the Graduates had resumed their seats, the President announced that the Honorary Degree had been conferred upon two persons, stating their names and residences, which we have forgotten, (further than that they lived in that small part of the State of Camden and Amboy known as New Jersey.) The peculiarity of this procedure consisted in the neglect, on the part of the President, to state that these Honorary Degrees had been conferred upon the said parties by the Board, and against the wishes of the Faculty, who had, we understand, entered their protest against any such action.

We learn that among the Board of Corporators there is but one Dentist to be found. The Faculty of the Colleges are, on the contrary, all practical and practicing Dentists. They are considered as the responsible parties by the profession, and are unquestionably the only persons connected with the institution who can be considered as judges of professional ability. Looking at the question in this light, we must confess that the action of the Board of Corporators argues for them an amount of presumption and a want of principle that might be expected among politicians, but that no one would look for among the Trustees of a Scientific or Literary institution. Of course, no gentleman could accept a degree conferred under such circumstances.

After the commencement exercises were over, the guests, students, &c., adjourned to Parkinson's, where a collation was disposed of in a manner satisfactory to all parties. A number of speeches were made, and the evening passed off very pleasantly.

Prof. Arthur took occasion, in a very frank and manly address, to protest publicly against the procedure of the Board of Corporators alluded to above. His remarks were received with unqualified applause and an enthusiasm which evinced most satisfactorily that the sympathies of the Dental Profession were on the side of the Faculty.

We have since learned that at a special Faculty meeting, held on Monday evening last, the Faculty resigned. This seems a most summary method of blotting a very flourishing institution out of existence; but we do not see that any other course was open to them.

If the Board of Trustees had the power and inclination to grant degrees against the wishes of the Faculty, they would soon begin to refuse degrees to those whom the Faculty thought were entitled to them. The truth of the matter is, that the odium of the ruin of the school must rest upon the heads of those who, by their most unwarrantable and unprincipled behavior, have compelled the Faculty to make choice between their self-respect and their position in the College. Their action in the matter merits the thanks of the Dental profession.

OMISSION.—The translation from Dr. Rossi, "Memoir on the loss of the teeth," is *to be continued.*

New-York Dental Recorder;

DEVOTED TO THE THEORY AND PRACTICE OF

Surgical, Medical and Mechanical Dentistry.

Vol. X.] APRIL, 1856. [No. 4.

MEMOIR ON THE LOSS OF THE TEETH.

BY DR. ROSSI, PARIS, 1852.

[TRANSLATED FOR THE RECORDER.]

Continued from page 52.

This article, in the last number of the Recorder, ended with a table which presented to the mind an analytical summary of what preceded. These propositions will now be successively examined, giving the necessary explanations.

We will treat of predisposing causes secondly, although a contrary division used to be considered more logical. We will be better understood by first making known the occasional cause.

DISCUSSION.

§ A.—Destruction of the Teeth.

The osseous tissue is never diseased. Its destruction is due to the action of one or of several acids.

Anatomical examination will not allow us to admit that the destruction of the teeth is due to a pathological state. In fact, there are no nerves, no vessels in the thickness of the osseous tissue. We cannot comprehend a morbid phenomenon taking place in a tissue which escapes the decomposition or constant recomposition which belongs to physiological life.

We further know that the crowns of the teeth are so formed that the osseous layer of the oldest formation is most superficial. This layer, once formed, cannot afterwards submit physiological modifications. Those which are subjacent, form in their turn as they are to remain until the fall of the teeth in extreme old age.

How, then, can a pathological condition be admitted, suddenly

arising in this tissue, which, like all the epidermic tissues, only holds life in a very obscure manner? The connections of the teeth may be diseased; they are organized. But the teeth are to them what the nail is to its matrix, the hair to its bulb.

This is what reason would indicate *a priori*, and the conclusion would be perfectly logical. In the absence of facts, however, and of physical evidence, there might remain some doubts. Facts are not wanting to support the theory; we will cite one so clear, so convincing, that it is impossible the most scrupulous mind should not be satisfied with it. It casts the clearest light upon this question.

Human teeth placed in the mouth after having been extracted several months, several years, filed, sawn, ground, perforated to receive a *pivot*, a metallic stem, which serves to implant them in the fangs of the subject, decompose *in the same places*, in the same manner, with *the same appearances and following the same phases* as the teeth belonging to a living subject.

A vital phenomenon is assuredly not in action here.

It is evident that these teeth are utterly *dead*, and can only submit an inorganic *chemical* deterioration.

We could accumulate arguments and proofs; but, we repeat, what would they add to evidence after a fact like this? But where is the practitioner that has not seen this occur a hundred times under his own observation? Who will contradict its existence?

It is then by a chemical decomposition of the salts which give to the tooth its hardness, then a putrid decomposition of the cartilage, which is as its skeleton, that the tooth loses little by little its substance.

This chemical decomposition is aided by,

1. Acids which are in the natural humors of man. 2. Acids which result from the putrid or acetic decomposition of aliments. 3. Acids coming directly upon the teeth in the form of drinks or medicines. We will now successively examine these various causes.

ACIDS WHICH ARE IN THE NATURAL HUMORS OF MAN.

(*Buccal mucus, saliva, gastric juice.*)

The buccal mucus with which the teeth are constantly in

contact, particularly in the upper jaw, is acid in its normal state.

It is secreted by the mucus follicles which cover the surface of the mucus membrane. Under certain conditions, as, for example, in case of indisposition, of severe illness, this acidity augments. It may be very marked.

The buccal mucus principally covers the front teeth of the upper jaw. In individuals of a lymphatic temperament, it is in much greater quantity, much more acid; with women, for example. The acidity of the buccal mucus is neutralized by the alkalinity of the saliva.

The saliva is secreted by numerous glands which are situated under the tongue, in the cheeks, &c. It is slightly alkaline, loses in certain cases its alkilinity, and may even sometimes become acid. All grave melodies take from it its alkilinity, and render it more or less acid.

In the lower jaw, from the first bicuspid, the saliva bathes the teeth more and more, in proportion as they approach the median line. For it is this point which is most dependent.

The saliva neutralizes the acidity of the buccal mucus when the subject is in a perfectly normal condition.

The gastric juice secreted in the stomach is never in contact with the teeth in a state of health; but it is otherwise in certain affections, in those which, during digestion, excite vomitings, belching of partially digested substances, eructations. Then its acidity is very marked.

ACIDS FORMED BY ELEMENTS INDEPENDENT OF THE SUBJECT.

1. Acids resulting from the putrid or acid decomposition of elements.

In masticating food, fragments penetrate between the intervals which separate the teeth, in the open triangles formed by the *neck* near the gum.

These triangles and these intervals are so many storehouses which guard the *detritus*, and protect it from the action of the lips and the rubbing of the tongue.

The mouth remaining closed during sleep, fermentation is favored by its heat and natural moistness.

Tooth-picks, which are used after meals, only effect the removal of the coarsest portions of this *detritus*, and the spaces through

which this instrument will pass are precisely the ones where, what the pathologists term *caries*, is generally met with. It is also there where *chemical decomposition* actually commences.

Acids arising from the fermentation of alimentary detritus are the most important, the most active. Certain aliments produce more than others; sugar in all the forms it is taken, milk and its various preparations, are of this class Some, as meats, azotized matters ferment putridly, and form different acids—azotic acid, for example. Others, as milk, sugar, &c., ferment acidly, forming lactic, saccharic acid, &c.

A chart might be made of the acids arising from the fermentation of alimentary detritus, and the aliments which produce them. But this would require considerable chemical labor, and devoid of demonstrable utility; and as our only aim in this succinct exposition is to indicate the path, others may treat the question in a more extended manner.

2. Acids existing in certain drinks, certain medicines.

We have but little to say upon acid substances which are introduced into the mouth. It is clear that their action on the teeth must be immediate. It is insignificant if the act be not repeated; it may be followed by fatal results if repeated, and it becomes habitual.

In countries where cider is drunk, the malic acid which it contains deprives the teeth of their calcareous salts, above all, in the interstices where, during the meal, this beverage mixes with the alimentary detritus, which serves as a sponge to keep it in contact with surfaces entirely protected from friction. It is the same with whey, which is the ordinary drink of some mountaineers.

In these countries, the men, and more especially the women, lose their teeth at an early age.

Popular instinct, often perspicacious, has for a long time indicated a chemical cause in accounting for the destruction of the teeth, and has cast reproach upon certain potable waters. The fact is essentially true, but ignorance erred in the attribution of the cause. To a person possessing any knowledge of chemistry, potable waters contain only neutral salts, without any action upon the calcareous salts found in the teeth; and moreover, they

are in such feeble proportions, that it would be puerile to take them into consideration.

But it is to the drinks we have just mentioned, and especially to the bad quality of teeth in certain climates, that their destruction must be attributed. We will state presently to what this bad quality is owing.

Certain medicaments, as sulphuric lemonade, directly destroy the teeth. We only state this here to impress it upon the mind.

There results from the action of one, of several, or of all these causes combined, (the predisposing causes aiding,) a process of decomposition which proceeds thus:

At first the enamel is slowly attacked, because it resists forcibly, but it is destroyed. Then the dentine, not so hard, containing less salts, is destroyed in its turn more rapidly than the enamel.

On account of this diversity of structure between the enamel and dentine, a cavity is hollowed out, deeper and deeper; but its borders, formed by enamel, present a smaller diameter than the walls of the cavity within the thickness of the dentine.

This form is particularly favorable to the retention of aliments. The fermentation which results yields acids which, in quantity and quality, are in direct ratio to the power of the generating elements. The cartilage deprived of its salts, saturated with animal matter, becomes putrid, and exhales a strong and penetrating, decomposing odor. The cavity enlarges and becomes a more extensive receptacle. In this focus destruction gains new forces. Soon a notable portion of the tooth no longer exists, and finally the havoc stops when only the fangs remain.*

It frequently happens, however, that the borders and walls of the cavity formed by the enamel break and fall in. There is then, strictly speaking, no longer a cavity, but a tooth, which has

* It is appropriate here to throw in, incidentally, a useful observation. It would be a serious error to believe that the fangs cannot decompose; the causes which act upon the crowns of the teeth act also upon the fangs. Only, here, there is no enamel, the decomposition is slow, regular; it proceeds by horizontal layers; it does not hollow out a cavity, unless the canal of the fang be very large. Then aliments insinuate themselves, remain there, and soon make a funnel of the fang. Except in this case, as aliments cannot readily remain upon a plane surface, the destruction frequently stops.

met with a more or less important loss of substance; and as, in the absence of borders and walls, aliments can no longer be retained there, destruction is arrested, and the portion of the tooth which still remains is preserved.

At other times, by a modification of the constitution, very common at the epoch of puberty, one of the causes ceases to act, (the acidity of the buccal mucus, for example), and the decomposition, scarcely commenced, is suspended.

In the two above-mentioned cases, the surface upon which the decomposition has ceased its work hardens by the contact of the air, and under the influence of heat and cold, like the stone taken out of the quarry; the coloring molecules of aliments and drinks are deposited, give it a dark color, which becomes more and more intense, and the tooth remains for an indefinite period in this condition.

§ B.—Certain conditions particularly predispose to the decay of the teeth; these are what we have termed predisposing causes. We will repeat them.

1. Quality of the tissue of the teeth.
2. Form of the teeth.
3. Arrangement of the teeth.
4. Traumatic lesions.

1. Quality of the Proper Tissue.

Two elements enter into the tissue of the teeth: 1. Cartilage, (in the dentine only); 2. The salts which give hardness and resistance.

These elements vary in their proportions according to the unequal distribution which occurs in each individual, depending upon constitution and temperament. In this particular the teeth have something in common with the bones; their elements are the same, cartilage and calcareous salts.

Under the influence of the constitution, confirmed or modified by climate, mode of life, habits, the bones are more or less compact, more or less cartilaginous. The solids or the fluids are in excess. The teeth, like the bones, are in subjection to these causes, for the hardness and molecular arrangement of their tissue.

The lymphatic temperament, from the softness of its bones and teeth, predisposes more than any other to the chemical destruction of the latter. It is owing to this temperament being so universal in damp countries, in which the fluid elements are in excess in the economy, that the early and rapid decay of the teeth must be attributed among the inhabitants. We may cite the Belgians, the English, the Hollanders, &c.

The inhabitants of the South, on the contrary, have well ossified teeth, because they are under the influence of opposite causes. They possess a nervous, a bilious, or a sanguine temperament. Their blood is rich, abounding in solid elements. Their tissues, instead of being subjected to a continual imbibition in the midst of an enveloping humidity, dry under heat and insolation. They therefore generally have good and beautiful teeth, which they preserve firmly implanted in solid alveolar processes, accompanied by healthy gums, until a very advanced age.

Women, all other things being equal, do not preserve their teeth as long as men; they are more lymphatic, and during pregnancy and lactation the buccal mucus and the saliva are modified.

2. Form of the Teeth.

If the teeth have a very marked conical form; if, touching at their points, they are very much separated near the neck, and leave at this place an open triangle; if the insterstitial gum which should fill this space is soft, only slightly adherent or entirely absent, these are unfavorable conditions.

In fact, if they are of a conical form, separated by a considerable space at the neck, aliments sojourn there in large quantities. Destructive elements are harbored in direct proportion to this condition. This happens especially when the interstitial prolongations of gum of which we have already spoken are slightly formed, or do not exist at all. This applies particularly to the front teeth of the upper jaw. When these teeth have their external surface much arched, the lip is tangent to one point only of their surface, and the upper part of the tooth contributes to form an open triangle, formed above by the projection of the gum, behind by the tooth, and in front by the lip. Alimentary detritus covers the upper part of the tooth, and is held there by the contact of the lip below it. This form is also unfavorable.

The grinding surface of the molars is often attacked; it presents numerous elevations, slight eminences, separated by furrows of greater or less depth, folds and crevices more or less marked.

Just where these furrows intersect each other at different angles, and in the bottom of these furrows, alimentary detritus is easily arrested. The enamel, moreover, in these places, is only placed in contact, that is to say, there is not a *continuity*, but only a *contiguity* of tissue. A number of funnels may be here observed, which allow the moist detritus to penetrate by the phenomenon of capillary attraction to the dentine, which soon imbibes it and is decomposed; then the enamel, if well ossified, resists; the dentine, on the other hand, gradually softens. This condition requires to be examined with the greatest attention, for interiorly the decomposition is often extensive, and nothing betrays it exteriorly but a slight brown or violet shade, when the enamel is sufficiently transparent.

It is this form of decomposition which has deceived careless observers; this that has made them believe in the existence of *internal caries*, and reject the only and the true cause—chemical action. Here, as in every instance, false observation has led to a false conclusion. There is no more existence in *internal caries* than in *external caries;* it is evidently a chemical decomposition, which, of necessity, and *in every instance*, proceeds from the exterior to the interior, since the only agent is external.

Without dwelling longer on this subject, we will state that we have examined some hundreds of molars, apparently sound, and that we have *always* found a free passage through the enamel when there was any decomposition under it, in the substance of the dentine. A magnifying lens has enabled us to verify this fact in cases where the eye unaided did not suffice. With us, this is an absolute truth, and we can affirm to those who may doubt it, that if they will take the trouble they will see what we have seen.

[TO BE CONTINUED.]

LOCAL ANÆSTHESIA BY CONGELATION.

BY H. L. BURPEE, WILLIAMSBURGH, L. I.

Since my communication on the subject of Anæsthesia by Congelation, in February last, I have spent much time in investigating, experimenting, and improving upon my apparatus, and consequently have arrived at more definite conclusions upon some points on which, at that time, I could not speak with full confidence.

In the first place, allow me to say that I do not in the least wish to detract from the merits of any person or persons who have taken this matter in hand heretofore; for instance, Dr. Branch, of Galena, Ill., so far as I know, was the first in this country to claim success in extracting teeth without pain, and I trust will receive his due reward. The accounts I have read in this Journal from the pen of J. Richard Quinton, of London, were certainly very interesting and profitable, and, I freely acknowledge, have proved of much service in guiding us in a path where much darkness existed, for I freely confess to former attempts which proved abortive.

So far as Dr. Branch is concerned, the profession at large are greatly in the dark; but I must think that a direct application of cold for the extraction of teeth cannot come into general use, in consequence of the severe pain it causes when applied to a vital tooth, or to one suffering from a high state of inflammation, although the time required to produce numbness is a half minute shorter by such a process. Would such an application answer for general use, an apparatus could be constructed at a trifling expense; but it is with such means that we are in danger of paralyzing the muscles and parieties of the face.

I have now adopted into general practice, an apparatus with which the requisite numbness to extract a tooth without pain can be produced in a length of time varying from one and a half to two and a half minutes, according to circumstances, and this, too, by commencing with warm water, and *graduating the cold at will*, by which process the patient suffers actually nothing in the application, and seldom any pain is felt in removing the tooth.

Perfection, however, is not claimed. This apparatus consists of a *combination force pump*, by which two fluids (warm and cold) can be thrown together or separately, through a flexible tube, into a mouth-piece, covering the tooth and surrounding gum, (the muscles of the face and tongue being protected by a *non-conductor*,) and passing off through a flexible tube leading to a vessel placed in a convenient position to receive the waste fluid. The length of time employed in preparing for the operation occupies but a few minutes, and the patient is highly pleased with the result. But I most heartily accord with the views expressed by Quinton, that "you must not only graduate the cold on, but must graduate it off;" and herein consists the safety in the use of cold; for although you may protect the muscles of the face and the tongue by having a mouth-piece made of material which will not communicate the cold where you do not wish it to go, there is still danger of pain or hemorrhage, (and sloughing, if the parts be frozen,) unless proper precautions are used to prevent it.

In my own practice I have not experienced the slightest difficulty; but allow me to add, I have used *constant* caution.

The cold fluid which I have used is of a nature from which no harm can result, in case of accident or rupture of the mouth-piece.

I am not sure that all the precautions used are always necessary after extraction, and in one instance of direct application of the cold fluid, no serious pain was experienced; but the teeth to which the cold was applied were dead stumps. Hence we may, in some instances, apply cold at once, but it is better to be safe, as the extra trouble is but little.

It is the deliberate conviction of myself and those to whom these facts are known, that this new and powerful agent may be brought into general use for dental surgery, (also in minor operation of operative surgery,) in such a manner as greatly to enhance the interest of the dental profession, inasmuch as the "danger to life and limb" is as nothing when compared to ether and chloroform, and its results are quite as satisfactory, so far as freedom from pain is concerned, and its effect on the general health decidedly beneficial, inasmuch as the patient is relieved of

much *dreaded* pain and *anxiety of mind*, which often enfeeble persons of slender constitution and poor general health, and render them unfit for their usual avocations for some time subsequent to the removal of the offending member.

This, then, is the proper view of the matter, that it saves the patient much fatigue of mind as well as body, and leaves *none* of the ill effects of ether and chloroform; and who that can find the requisite fee would not rather pay a treble amount to be relieved from pain in tooth extraction, and know that no danger from any source is to be apprehended?

DISEASES OF THE DENTAL PULP AND THEIR TREATMENT.

BY CHAPIN A. HARRIS, M. D., D. D. S.

[CONTINUED FROM PAGE 65.]

Spontaneous Disorganization.—This affection, as the writer has stated in another place, seems to have been entirely overlooked by writers on dental pathology, and although it is one which rarely occurs, examples of it are met with sufficiently often to entitle it to a place among the diseases of the teeth. The first case to which his attention was particularly directed, occurred in 1836. Since which time, eight or ten other cases have fallen under his observation. In each, the disorganizing process was carried on so insidiously that neither structural alteration or the existence of diseased action of any kind was suspected, until the teeth assumed a dull bluish brown appearance. In neither case, so far as could be ascertained, was there the slightest indication of inflammatory action. The death was seemingly the result of the suspension of the untritive function occasioned by the want of sufficient vital energy to carry it on.

In all the cases which the writer has seen, the sockets of the teeth were, apparently, in a healthy condition, the margins of the gums thin and regularly scolloped, without any indications of structural alteration, except that they had a dingy grayish-purple appearance, instead of a pale rose color, the aspect they exhibit around living teeth in good constitutions. The disorganized pulp

does not, as in those cases where it has perished from inflammation or from the application of escharotics, seem to exert any morbed effect upon the parts at the extremity of the root. This, as he has elsewhere stated may be owing, in part, to diminished excitability in the alveolo-dental periosteum, and to the inoxious character of the disorganized matter. The death of the pulp in all the cases which have fallen under his observation occurred before the twentieth year of age. It rarely takes place in a single tooth, though examples are occasionally met with, but in the majority of cases it occurs simultaneously in corresponding teeeh, the pulps of two or four usually perish at about the same time. In the first case which came under his observation, six had perished. The incisors, however, appear to be more particularly subject to it than the molars and bicuspids, and it occurs as frequently in sound as in decayed teeth.

The death of the pulp not being the result of inflammation, must be depended upon constitutional rather than local causes, upon some impairment of the function of sanguinification or an exceedingly serious condition of the blood.

The subject of the first case seen by the writer was a young lady about eighteen or twenty years of age, of a chlorotic habit and having a slightly bloated aspect of countenance. The discoloration of the teeth had existed several years and was confined to the four upper and two central lower incisors. The parents of the young lady supposed it was occasioned by caries in the approximal surfaces, and it was for the removal of this that he was consulted, but the teeth, upon examination, were, to their astonishment, found to be perfectly sound. Not the slightest indication of structural alteration in either the anamel or dentine could be detected. The cause of the discoloration was now ascertained to be the result of the disorganization of the pulps, and the removal of these seemed to constitute the only and proper remedial indignation. With a view to which, a perforation was made in each of the upper incisors, from the palatine side to the central chamber, large enough to permit the complete removal of every thing contained in them. A drop or two of dark brown matter, of about the consistence of thick cream, and almost wholly without odor, immediately escaped. The walls of these cavities were

slightly discolored, but on being scraped they became as white, though not as translucent as healthy dentine. The natural color of the teeth having been very nearly restored, the pulp-cavities and roots were filled in the manner as already described. The two lower incisors not being so conspicuous, were permitted to remain as they were.

It rarely happens that a tooth which has lost its vitality by the spontaneous destruction of the pulp, gives rise to the formation of alveolar abscess. The writer does not recollect of having met with a single case in which this has happened.

Ossification.—With regard to this affection, the writer can only repeat what he has elsewhere stated upon the subject.* Ossification of the pulp of a tooth is a means employed by nature to prevent the exposure of this most exquisitely sensitive tissue. It is true, examples of it are occasionally met with in teeth which have not suffered any loss of substance, either from mechanical or spontaneous abrasion or from structural alteration of either the enamel or dentine. The occurrence, whatever may be the circumstances under which it takes place, is unquestionably the result of an established law of the economy, dependent, no doubt, upon moderate irritation and increase of vascular action. The deposition of earthy salts having commenced, it usually goes on until every part of the pulp is converted into a substance analogous to, if not indentical with, cementum. Thus, it would seem, that when the pulp of a tooth becomes the seat of a sufficient amount of irritation, ossification follows as a necessary consequence, but if the irritation be succeeded by active inflammation, a different result takes place, namely, suppuration.

The irritation necessary to the ossification of the pulp of a tooth sometimes arises from constitutional causes, but in the majority of cases, it results from the action of local irritants, and most frequently, from impressions of heat and cold, communicated through the conducting medium of a metallic filling or a thin layer of dentine.

During the ossification, a sensation is occasionally experienced in the tooth somewhat similar, though altogether less in degree,

* See Principles and Practice of Dental Surgery.

to that which attends the knitting of the fractured extremities of a broken bone. A numb, slightly twinging pain, barely perceptible, is felt passing through the tooth several times a day, but lasting only a second or two at a time. It is scarcely sufficient to occasion annoyance, or to attract any thing more than momentary attention.

With the ossification of the pulp, the crown and inner walls of the root lose their vitality, but the appearance of the tooth is not, as in the case of necrosis arising from disorganization of the pulp, materially affected. The central cavity being filled with semi-translucent bone, or osteo-dentine, the crown retains its natural color. The discoloration and opacity attending necrosis, arising from other causes, results, partly from the presence of putrid matter in the pulp-cavity, and partly from its absorption by the surrounding dentinal walls.

There are several beautiful examples of ossification of the pulps of teeth in the Museum of the Baltimore College of Dental Surgery, and the writer has some eight or ten in his own private cabinet.—*Am. Jour. Dental Science.*

New Use of Gutta Percha.—M. Manoury, of Chartres, has announced some new preparations of gutta-percha which promise valuable practical results, consisting of the intimate mixture of different forms of caustic with that article, such as chloride of zinc, potassa, arsenic, &c., &c., of which there are three kinds. 1. Firm caustic plates, which are tenacious, and unchanged by the tissues, and which can be cut into any shape that may be desired; 2. Cylinders which can be carried in a porte-caustique, and which can take the place of sticks of nitrate of silver; 3. Threads for the purpose of removing certain tumors by strangulation and cauterization at the same time. He also combines gutta-percha with metallic powders, such as those of iron, copper, red sulpheret of mercury, iodide of lead, &c. Thin plates of this preparation are softened by boiling water or by gentle heat, and applied upon ulcerated surfaces, hospital gangrene, &c.

Cancerous tumors have been successfully removed by the threads of gutta-percha and chloride of zinc.—*Montreal Medical Chron.*

[For treating sensitive dentine or destroying the exposed nerves of teeth, we think the above might constitute a valuable improvement, provided the various drugs can be so thoroughly integrated with the gutta-percha as to be reliable for uniformity of strength. Zinc, arsenic, &c., can probably be more conveniently and *reliably* applied than by our present methods.—ED. RECORDER.]

OPERATION FOR THE REMOVAL OF A LARGE ARTIFICIAL TOOTH-PLATE FROM THE PHARYNX—RECOVERY.

(Case under the care of Mr. COCK.)

Mr. T. G., aged 22, a highly-respectable tradesman at Dartford, was brought to Mr. Cock's residence on Thursday, January 17, by Mr. Martin, surgeon, of Dartford.

It appeared that for some time he had been wearing a false central incisor tooth fixed to a gold plate, which extended some distance on either side. The foreign body, which was subsequently removed from the pharynx, may be thus described:—The plate formed the segment of a circle corresponding with the hard palate behind the incisor cuspidati and bicuspid teeth.—The one extremity terminated in a slender clasp, with two points as sharp as needles, and encircling the bicuspid tooth; the other extremity formed a single sharp point. The anterior edge of the plate presented three acute angular projections, which corresponded with the inter-dental spaces; and from this margin also the false tooth formed a prominent projection. The extreme length of the plate—in other words, the *sector* of the circle—was an inch and five-eighths; while a line drawn from the edge of the tooth to the sector measured exactly one inch.

This plate had been swallowed by the patient during sleep, about 2 o'clock, A.M.; and Mr. Martin, finding that it had stuck in the gullet, and could neither be seen nor felt from the mouth, brought him up to Mr. Cock for further advice.

There could be no doubt that the foreign body had lodged in the cervical portion of the swallow, but its exact situation was not very clearly indicated. The pain and irritation, together with tenderness on pressure, all of which were very considerable, were referred to the top of the œsophagus, just below the larynx; but no projection indicating the precise locality of the plate could be detected from the exterior. He was able to swallow fluids, although in very small quantities and with great difficulty. His breathing was not impeded, but he had an irritating laryngeal cough.

Under these circumstances, Mr. Cock judged it most expedient to delay any active measures for extraction until the patient had recovered from the immediate effects of the accident and the fatigue and excitement of his journey. He was, therefore, advised to go into the Hospital, in order that every available means might be used; and he willingly agreed to this arrangement. In the course of the afternoon he was visited by Mr. Cock, who passed a bougie into the pharynx, and found a total obstruction about the lower edge of the larynx; in fact, just at the junction of the pharynx and œsophagus. A pair of strongly-curved forceps detected the plate, but it could neither be grasped nor moved from its position. As his respiration was unimpeded, and the pain quite bearable when kept at rest, it was determined to postpone further measures until the next day. A full dose of opium was given, as much fluid nourishment as he could get down was ordered, and he was furnished with ice to suck at his leisure.

On Friday, January 18, Mr. Cock saw him with Mr. Hilton. He was calm and tranquil, and had not suffered acutely except when pressure was made from the exterior, or when he attempted to swallow. It appeared very doubtful whether any fluid which he took into his mouth found its way into the œsophagus. Attempts were made with several instruments to grasp or dislodge the plate, but they all proved abortive, and it was found impossible to pass any instrument between the foreign body and the walls of the gullet, so as to get it below the obstruction. Mr. Cock, at length, succeeded in introducing a flexible catheter, No. 5, which appears to have found its way between the horns of the clasp which formed one end of the plate. As a means of

conveying fluid into the stomach had now been obtained, it was suggested that the action of vomiting might possibly alter the position of the plate, and render it more accessible from the mouth. A pint of milk was accordingly conveyed into his stomach, and then half-a-drachm of sulphate of zinc and a scruple of powdered ipecacuanha administered. Strange to say, not even a sense of nausea was produced, and the emetics were retained without producing the slightest constitutional effects. A mode of administering nourishment had, however, been obtained, and we could, therefore, afford to wait and take the chance of any favorable contingency. On Saturday, January 19, Mr. Cock made another attempt. Since the previous day he had twice fed the patient with milk, wine, and beef-tea; but the catheter was passed with great difficulty, and there was only one particular spot on the left side where it could be made to penetrate into the œsophagus. He was unable to swallow a drop of fluid by natural efforts, but derived great comfort from sucking ice. Mr. Cock attempted to pass a looped wire round the plate, and also manipulated with a flexible tube, from the extremity of which a pair of forceps could be projected, but no success could be obtained, and farther proceedings were laid aside for the present. On Sunday, January 20, no attempts were made, but the patient was fed three times through the catheter; the introduction of the instrument becoming more and more difficult each time. On Monday, January 21, Mr. Cock again met his colleagues. It was now imperative that some decisive steps to remove the foreign body should be taken, as the flexible catheter could no longer be passed, and the patient was beginning to feel seriously the effects of want of nourishment and rest. The position of the plate was pretty clearly ascertained. It was impacted either at the commencement of the œsophagus, or else just above, (where the œsophagus and the pharynx join.) It was determined to cut down and open the gullet. Mr. Hilton assisted Mr. Cock in the operation.

The patient was placed on his back, with his head and shoulders slightly elevated. Chloroform was given, and he was soon quietly under its influence. An incision of about four inches in length was carried from the upper edge of the thyroid cartilage,

nearly as far down as the sterno-clavicular joint; on the left side of which the platysma and cervical fascia were divided, bringing into view the carotid sheath and the omo-hyoideus muscle, which was thick and fleshy where it crossed the wound. This latter was divided, together with some filaments of the descendens lingualis nerve, and two or three small arteries, which were immediately tied to prevent as much as possible infiltration of blood into the cellular tissue. A little farther dissection laid bare distinctly the common carotid artery, the inner connexions of which were easily separated with the handle of the knife and the finger. It was considered to be an important object to separate completely the carotid artery from its internal attachments; and this having been accomplished, the vessel, together with the sterno-mastoid muscle, was drawn outwards and retained by retractors, and thus rescued from injury or molestation, while the further steps of the operation were carried on, the object of which was to reach the upper portion of the œsophagus.

The thyroid body was now exposed by dividing a few of the external fibres of the sterno-hyoid and sterno-thyroid muscles, and the dissection was continued along the outer surface of the gland backwards towards the spine. The tissues were separated partly by the handle of the knife, partly by the blade. An artery, probably a branch of the superior thyroideal, was divided where it crossed the upper part of the wound, bled freely, and was secured with some difficulty. A larger vessel, probably the inferior thyroideal, was seen running across lower down, but escaped without injury. The larynx and trachea were gently drawn over towards the right side, so as to widen the large wound which gaped along the side of the neck.

The œsophagus was reached by following round the surface of the thyroid body, which completely covered and concealed the trachea.

About two inches of the gullet could now be traced with the finger, but no projection indicating the presence of the foreign body could be felt. It therefore seemed tolerably certain that the plate had not descended into the œsophagus, and must be lodged in the lower part of the pharynx. With some difficulty, by tilting the larynx a little forwards and over to the left, the

finger was passed behind it, that is, between the pharynx and the vertebræ, and the body was now obscurely felt exactly behind the cricoid cartilage, protected as it were by the inferior course of the thyroid. The point of the knife was now brought to bear on what appeared to be the most prominent part, which proved to be the single tooth, and the grating sensation of the blade indicated that the pharynx was opened, and the foreign body reached.

The white tooth, in fact, became visible at the bottom of the wound; and, being grasped with a pair of forceps, the opening into the pharynx was dilated upwards and downwards with a blunt-pointed bistoury. After a little manipulation, one end of the plate was disentangled from its attachments and brought out of the wound, but the entire body was not extricated until a further slight division of the walls of the pharynx had been made. This, however, was soon accomplished, with the assistance of Mr. Hilton, who cut along the edge of the gold plate, while Mr. Cock gently withdrew it with one hand, and protected the parts with the fingers of the other. The patient was carried to his bed, and cold water applied to the wound, no means being used to bring the edges together. On recovering from the effects of the chloroform, he seemed to have suffered but little from the operation, expressed himself as comfortable and free from pain, and returned eagerly to his former occupation of sucking ice. An enema of beef-tea and wine was thrown up, as he had had no nourishment since the previous day. In the evening, he complained of great exhaustion, or rather sense of starvation, and Mr. Cock gave him nourishment through the catheter, and a full dose of opium.

January 22.—Was free from all untoward symptoms, and only complaining of an empty stomach. He was fed with milk and beef-tea three times. Sucking ice was a great luxury, although he believed that none of it passed into the œsophagus, and, as far as could be ascertained, no water found its way out by the wound. On the third day, January 24, Mr. Cock introduced the common œsophagus feeding-tube, which passed readily, without pain or obstruction. He has since been regularly fed by his dresser, Mr. Dyer, at first, three times, but afterwards, at his own

request, four times in the twenty-four hours. He is always ready, indeed eager, for his meals, and receives them with great enjoyment. His diet consisted of beef-tea, brandy, and egg, arrowroot, with milk or wine. Notwithstanding this nourishment, of which he swallowed about four pints in the twenty-four hours, he was evidently losing flesh and strength. Accordingly, Mr. Cock ordered as much pounded meat to be mixed with the beef-tea as could be made to pass through the tube, and directed an ounce to an ounce and a half of cod-liver oil to be given at each meal. He takes an opiate every night, but the quantity is undergoing gradual diminution.

February 5.—The increase of nutriment, or the oil, or both, have produced a decided improvement in his appearance, and he expresses himself as feeling stronger and better. His spirits have all along been good and hopeful.

The wound has looked healthy from the first, and has now contracted to half its original size. Since the operation, nothing has been swallowed by natural deglutition, and he is very unwilling to make the attempt, as it causes considerable pain, and a sensation as if the wound was being rent open. He does not appear to swallow his saliva.

Had the foreign body been lodged in the upper part of the œsophagus, its extraction would probably have been more easily accomplished; but the protection which was afforded by the cricoid cartilage in front, and the posterior edge and inferior course of the thyroid, which, as it were, overlapped it at the side, rendered the access to it difficult and tedious, and materially complicated the operation.—*London Medical Times.*

Out of 44 deaths from chloroform, 7 took place when the Surgeon was just about to begin the operation; 12 occurred during its performance; in 8 cases the operation, being of short duration, was completed before it was discovered that the patient had expired; and, in the remaining 17 cases, the inhalation was discontinued, at some period of its progress, owing to the sudden occurrence of alarming symptoms.—*Dr. Snow on Chloroform.*

A serious error, with regard to chloroform, was to suppose that the patient was safe so long as he had sufficient air for the purposes of respiration; the truth being, that the more air he breathed the greater was his danger, if the air were too highly charged with vapor. The air breathed by the patient should never contain more than about 5 per cent. of the vapor of chloroform; if it contained 8 or 10 per cent., it was liable to cause sudden death by suspending the action of the heart. Dr. Snow recommended the use of an apparatus for regulating the quantity of vapor of chloroform in the air, but those who preferred to use a handkerchief, or sponge, might avoid the risk of danger, by diluting the chloroform with an equal measure of rectified spirit before using it. In case of accident, he considered the artificial respiration, very promptly and efficiently performed, afforded the best prospect of success.—*Dr. Snow on Chloroform.*

EDITORIAL.

Since our last issue we have been furnished with the particulars of the commencement of the Baltimore College of Dental Surgery. The exercises came off on the evening of the 4th of March. The opening address, by Dr. Solyman Brown, of New York, is spoken of as being, in all respects, an excellent one, and was delivered in his usually happy manner.

We give below a list of the Graduates and the subjects of Thesis presented:—

LIST OF GRADUATES, WITH SUBJECTS OF THESIS.

A. H. Balderston,.....Baltimore, Md.
Anatomy and Physiology of the Human Economy.

S. A. Bruce,.....Farmville, Va.
Odon-atrophy.

T. J. Corpening,.....Morgantown, N. C.
Effects of the Retention of Carious Teeth.

R. C. Cyphers,.....Woodbridge, N. J.
Vitality.

W. F. Edington,.....Dundee, N. Y.
Dental Caries and its Treatment.

W. H. Hoopes,.....Baltimore, Md.
Dental Physiology.
C. M. King,.....Philadelphia, Pa.
Arsenic.
J. M. Lauck,.....Washington, D. C.
Extirpation of Dental Pulp.
G. C. Lewis,.....Raleigh, N. C.
Abscess.
G. W. Neidich,.....Carlisle, Pa.
Irregularities of the Dental Arch.
B. H. Padgett,.....Hicksville, N. C.
Preservation of the Teeth.
C. W. Reed,.....Winchester, Va.
Dental Hygyene.
R. B. Reynolds,.....Philadelphia, Pa.
Mercurial Stomatitis.
E. W. Swentzel,.....Lancaster, Pa.
Inflammation of the Mouth.
T. O. Walton,.....Annapolis, Md.
Saliva.
E. Weiler,.....Belleville, Pa.
The Teeth.
J. W. Whitmore, M. D.,.....Houston, Miss.
Difference between Bone and Teeth.

ORDER OF EXERCISES:

MUSIC.

Charles Moore King,.....Pennsylvania.
Joseph Manly Lauck,.....District of C.
George Clement Lewis,.....N. Carolina.
George Washington Deidich,.....Pennsylvania.
Berrymon Hicks Padgett,.....N. Carolina.
Christopher Winfree Reed,.....Virginia.
Robert Bruce Reynolds,.....Pennsylvania.
Edward William Swentzel,.....Pennsylvania.
Thomas Oliver Walton,.....Maryland.
Elias Weiler,.....Pennsylvania.
John Wesley Whitmore, M. D.,.....Mississippi.

Valedictory Address by Dr. Solyman Brown.

MUSIC.

BENEDICTION.

MUSIC.

By the following record of operations performed in the Infirmary, it will be seen that the Students have something to do in addition to attending the numerous and important lectures delivered during the course. The Infirmary practice of this institution has become enormous, and too much cannot be said of the importance to

the student of the means thus afforded of obtaining practical information, and of attaining rare skill in the operative and mechanical departments of Dental practice. The record of Infirmary practice, for the past few years, has shown a rapid, though constant increase, and during the past year the number of patients applying for treatment has been so great as to demonstrate most conclusively the necessity for increased facilities for the reception and accommodation of patients. These will be furnished in time for the next session, and we understand that a Demonstrator of Operative Dentistry has also been appointed, not for the purpose of lessening the duties devolving upon the Professor of Operative Dentistry, but to meet the demands of this immense Infirmary practice.

The record of operations performed in the Infirmary by the class of 1855–6 is as follows:—

Extractions,	2437	cases.
Fillings,	965	"
Filling over exposed nerve,	9	"
Filling to end of fang,	8	"
Removal of tartar,	35	"
Diseased gums,	30	"
Irregularities,	3	"
Pivot teeth,	15	"
Disease of Antrum,	1	"
Fungous Tumor of sup. Max.,	1	"
9 double sets of artificial teeth,	18	pieces.
19 entire upper sets,	19	"
5 entire lower sets,	5	"
18 partial upper,	18	"
1 partial lower,	1	"
Total number of pieces,	61	

Allowing twelve teeth (the smallest number) for each upper or lower set, and five (probably less than the average) for each partial set, we have the total of six hundred and twenty-four teeth inserted by the Students for the Infirmary patients in less than five months. The *whole* of this work is done by the Students, under the guidance of able Superintendents; and when we add to these immense practical advantages the important and valuable lectures delivered by the various members of the Faculty, we cannot conceive how any one can *rest contented* with the meagre advantages of private office instruction. We would, by no means, be understood as wishing to discourage the system of private pupilage; on the contrary, we would advise every student of Dental Surgery to study at least one year in the office of some respectable practitioner previous to entering upon a Collegiate course; but we do hold that, in the present advanced position of Dental science and practice, no beginner can leave the office or laboratory of a Dentist and commence practice solely on the necessarily limited information and experience there obtained, without committing an error, the grievous consequences of which will follow him through life. Certainly, within the past ten years, great changes have taken place in almost all things; but in nothing has the change been more imperatively

demanded, or the good results of such change more clearly demonstrated, than in the system of Dental education. Dental Colleges are a necessity. Knowing and feeling this, the present difficulties under which our Philadelphia brethren are laboring affect the whole Dental profession. Still there was no other course for them to pursue. They could not conscientiously permit the improper distribution of honorary degrees. The interests and dignity of the profession required that such a course should be instantly rebuked.

But it does seem hard that our interests, as a profession, should be made to suffer (in the loss of a flourishing and valuable school), simply in order to resist and counteract the unprincipled acts of a few designing men.

Dr. E. Maynard.—We understand that this gentleman, whose reputation as an operator is as universal as it is unrivalled, has accepted the Chair of Operative Dentistry in the Baltimore College of Dental Surgery, recently made vacant by the resignation of Prof. Blande. Dr. M.'s appointment was a wise movement on the part of the Faculty, and his acceptance of the position has occasioned intense satisfaction among the friends of the school and the profession generally. We think it was impossible for the Faculty to have made a more universally acceptable appointment. They have also accomplished long desired and certainly very much needed addition to their course, in the establishment of a Lectureship on the Microscopic and Comparative Anatomy of the Teeth. The position thus made has been conferred upon Dr. Christopher Johnson, of Baltimore, one of our most eminent microscopists, and lately connected with the Maryland Medical University. That this is a very excellent choice is conceded by all who are acquainted with the gentleman in question.

We learn that a call has been made upon the members of the profession in Missouri, with a view to the establishment of a State Society. The first meeting is to take place in St. Louis, early next month. An Association of Dental Surgeons was established in Michigan the past winter—its first annual meeting to be held in Detroit. This is a step forward. Who will help the Dental Profession in New-York to a little "brotherly love?" Why cannot a Dental Society be established? Have we not the men? Then we have *no Dentists* worthy of the name. What is to prevent us from establishing a useful and respectable association? Who is there ready to sacrifice self interest—personal jealousy—vain glorious pride, and many other *useless* things for the sake of benefitting the profession to which we all owe so much? If there are *any such*, then we have the men who can and who *ought* to take the initiative in this direction. Dentists of the City and State of New-York, let us hear from you on this subject.

New-York Dental Recorder;

DEVOTED TO THE THEORY AND PRACTICE OF

Surgical, Medical and Mechanical Dentistry.

Vol. X.] MAY, 1856. [No. 5.

INTRINSIC CALCIFICATION OF THE PERMANENT TOOTH-PULP (as constantly associated with Dental Caries).

BY S. JAMES A. SALTER, M. D., F. L. S., ETC.

My object in this communication is to give an account of a peculiar morbid condition which occurs in the tooth-pulp of carious teeth, affecting the pulp after it has arrived at its adult form and its functions, in the development of primary dentine, have ceased.

This pathological change may be defined as the impregnation of the various tissues of the tooth-pulp with calcareous matter—their calcification, in fact—occuring in multitudes of isolated points, and by the multiplication and enlargement of these islands of calcification, involving more and more of the structures of the pulp, and its ultimate *conversion*, under certain favorable circumstances, into that peculiar form of secondary dentine called *osteodentine*. The occurrence, to some extent, of islands calcification in the pulps of carious teeth is (as far as my observations go) as universal as it is unknown.[a] The complete issue of this process in the evolution of osteodentine is by no means common, and only occurs under certain favorable circumstances, when the process of calcification may continue for a long period, uninterrupted by the laying bare of the pulp cavity.

[a] Mr. Tomes was probably acquainted with the *results* of this process when in an advanced stage; but he appears to have confounded the structure produced (osteodentine) with dentine of repair as well as being wholly unacquainted with the intimate nature of the changes that occur. He remarks, "We see instances of this event of irritation in cases where the pulp is *converted* into dentine opposite a point from which a portion of enamel and of the dentine of the crown has been removed by wear, by fracture, by the file, or even by caries." ('Dental Physiology and Surgery,' p. 254.) Mr. Tomes is here evidently speaking of dentine of repair, as

It will be necessary, before entering upon the details of this subject to make a few remarks upon the changes which occur in the production of normal dentine, and the manner in which the pulp is reduced to its adult condition, as well as the anatomy of the latter organ; and this will be necessary both as a basis for the explanation of the pathological changes, and also to show the analogies, and at the same time the differences, between the normal process and the pathological changes, which I here endeavor to elucidate.

The formative tooth-pulp is a papilla, consisting of numerous blood-vessels and nerves, distributed through multitudes of cells and nuclei, and an immature connective tissue, and covered in by a basement membrane—the whole constituting a form precisely similar to the dentine of the crown of the future tooth. A series of columnar cells, very similar in appearance to those of columnar epthelium, is found arranged in an even layer upon the surface, covered in only by the basement membrane; from the distal extremities of these cells appear outgrowths, in the form of capillary tubes, and continuous with the cell-wall, and these increase in length by the backward recession of the body of the cells, the tubes being thus prolonged inwards: these constitute the animal basis of the dentinal tubes. The intertubular

may be seen by the figures in his own work, and to which he refers (figs. 32, 84, and 98), as well as by my figures in the 'Guy's Hospital Reports' (On Dentine of Repair, &c., 'Guy's Hospital Reports,' vol. viii, part ii). *Now here the pulp is not "converted" into dentine.* It is produced simply, as in normal dentine, by the outgrowths of the superficial cells and has no analogy to the change I am describing. Again, Mr. Tomes says, "Indeed, if the pulp of a tooth extracted for caries and subsequent odontalgia be carefully examined, there will, with few exceptions, be found more or less calcification near the point towards which the disease had advanced." (loc. cit.) He probably here speaks of calcification of the pulp in an advanced stage; this is very palpable to the unaided senses. The pulp, however, *does not* calcify soonest near the decayed part: on the contrary the pulp is soonest affected by intrinsic calcification near the extremity of the fang, and the limitary clear layer on the surface is the *last* to calcify. That Mr. Tomes was unacquainted with the early condition of intrinsic pulp calcification, as well as the nature of that process, is sufficiently obvious from the following observations: "By irritability, here is meant an increased susceptibility to pain, and to morbid action, *unattended with organic change.*" "The most frequent cause of irritability is caries immediately prior to its laying open the cavity." (loc. cit.) Now it was from just such a tooth that the pulp was taken from which fig. 5 was drawn, exhibiting most clearly the "organic change" I am describing.

tissue appears to be formed of a hyaline animal structure, in which no histological elements are indicated.[a]

It must be recollected that this process is entirely superficial; that it occurs from without inwards; that no other histological elements enter into the formation of the dentine besides the cells described; and that the nerves and blood-vessels recede as the dentine advances. The "*conversion*" theory, which involved the idea of a complete change of the entire pulp-structures into *normal* dentine, is now known to be altogether erroneous; and this it is especially important to remember in relation to the present subject.

The mode in which the animal material is impregnated with the calcareous in primary dentine is very remarkable, and has a certain similarity to the morbid condition I am about to describe. It has been shown by Czermak,[b] and confirmed and still further elucidated by myself,[c] that after the animal material of dentine has sketched out its anatomical form, it becomes calcified, not by an even gradual impregnation throughout the whole, nor in any relation to the course of its structure, but in isolated globular patches, by the enlargement and fusion of which the whole is formed into an even coherent mass. And I would further remark—what is of value and interest in reference to the present matter—that the animal material is palpably altered at the time of calcification in physical and chemical characters: it is harder, denser, and contains less water in proportion to the animal solid matter.

I have already alluded to osteodentine as the issue under certain circumstances of the morbid change now under consideration, and I would here observe that osteodentine constitutes one of those peculiar forms of dentine called "secondary" on account of their being after-formations—developed, that is, after the primary system of dentine has been matured. I must add, that the other

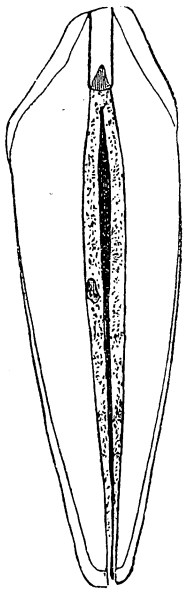
[a] Kollliker, 'Handbuch der Gewebelehre des Menschen,' 1852. Also Lent, Ueber die Entwicklung des Zahnbeins und des Schmelzes, in Siebold and Kolliker's 'Zeitschrift fur Wissenschaftliche Zoologie,' 1854.

[b] Czermak, Beitrage zur mikroskopischen Anatomie der menschlichen Zahne, in Siebold and Kolliker's 'Zeitschrift,' 1850.

[c] On certain appearances occurring in Dentine dependent on its mode of Calcification, in 'Journal of Microscopical Science,' vol. i.

two forms of secondary dentine, "dentine of repair" (formed by laminæ on the inner surface of the pulp-cavity, as repair and recompense for external wear, decay, or fracture) and "dentine-excrescence" (a modular growth of dentine arising spontaneously on the interior of the pulp-cavity, and without disease or apparent cause)—that these forms are in all essential particulars the same as primary dentine, formed and calcified in the same way, having contour lines parallel to the surface, and not involving blood-vessels or nerves. The relation of these three forms[a] to

FIG. 1.



Diagrammatic section of canine tooth, showing the relative position of the three forms of secondary dentine. The tinted parts in the pulp-cavity represent the secondary tissue; the "dentine of repair" fills the summit of the pulp cavity, and corresponds to the worn exterior surface, the vertical lines on either side indicating the direction of the tubes which limit the external lesion and the internal repair. The "dentine excrescence" is situate on the posterior surface of the pulp cavity in the fang. The forming "osteodentine" occupies the axis of the pulp. Magnified 3 diameters.

one another I have thought it well to illustrate in a diagrammatic outline, fig. 1, representing them in an early stage, and before they have become confused together. The tinted mass at the top of the pulp cavity represents the dentine of repair in proportion to the wear at the top of the cusp, and the lines passing from the surface to the margin of this repair-tissue are the den-

[a] The different varieties of secondary dentine will be found more particularly discussed in a paper of my own, in the 'Guy's Hospital Reports,' already alluded to, where I believe they were first systematically arranged.

tinal tubes, limiting the external injury and the internal recompense; in the axis of the pulp, the tinted line indicates the forming osteodentine; and the nodule on the side of the pulp-cavity is dentine excrescence, in a frequent situation, and of a usual form. Though osteodentine is distinct from the other forms of secondary dentine, it is nevertheless frequently associated with them, especially with dentine of repair, and the union of the one with the other is the ultimate event of the secondary formations, where they reach entire completion; but this union is the very latest part of the change, and the soft external layer on the surface of the pulp, which separates the forming osteodentine on the one side from the primary dentine and the dentine of repair on the other, is the last to calcify.

My attention was first directed to the peculiar morbid change I am describing by noticing the physical alteration the pulp had undergone in association with caries. Upon opening the pulp-cavity of a carious tooth, I had noticed that the pulp was firmer and more coherent than in a natural state; that it did not collapse and readily dry up, but retained its form, and was frequently elastic when bent. It has occasionally happened that in extracting a carious tooth it has broken across at the neck, and the crown has come away, leaving the fangs in the jaw, the pulps of the fangs slipping out of their canals and remaining stiffly bristling from the broken surface of the crown. Such a specimen is represented at fig. 2. It was accidentally obtained in extracting a molar tooth, when, from some malformation of the fangs, probably embracing a mass of bone, the tooth broke across, and the pulps of the fangs came away with the crown, leaving the fangs still imbedded in the jaw. In this instance, the pulps were of the firmness, and possessed the elasticity of whalebone, and much reminded me of that substance. When the calcification is absolutely complete, as in the specimen figured in fig. 3,[a] the whole is perfectly hard and brittle. In every stage of calcification, excepting the very last, the axis of the pulp is the hardest and the

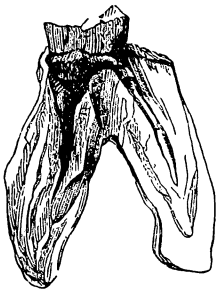
FIG. 2.

Crown of molar tooth; the semi-calcified pulps remaining attached.

[a] For the loan of the specimen from which this figure is taken, I am indebted to my friend, Mr. Samuel Cartwright, jun.

exterior more or less soft and pulpy. Until the complete solidification of the pulp, it may readily be torn up with points of needles, uniformly in a longitudinal direction.

Fig. 3.

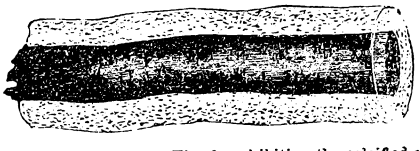


Molar tooth, with pulp wholly calcified, but still unattached to the primary dentine. The crown of the tooth is removed, that of the calcified pulp remaining. Enlarged about two diameters.

The color is also modified by the change, but this depends on the degree of calcification that has taken place. If examined in an early stage, before much earthy matter has been deposited, the pulp is usually found very red, and in a state of obvious hyperæmia, but as the change proceeds, the white calcific deposit reduces the color, and the pulp becomes opaque, and nearly white; and if the change reaches so far as to form osteodentine, then it is of a semi-transparent yellow, owing to the obliteration of almost all intervals in the structure, and the homogeneous mass, containing very few channels or interspaces.

To ascertain the meaning of the changes that have taken place, it is necessary to examine the pulps of teeth (taken from those variously decayed) under the microscope, especially with the aid of chemical reagents. And I may here remark, that in examining a very large number of the pulps of carious teeth, decayed in all degrees, and in every variety of place, I have not once failed to discover, in some degree, the condition I am describing; that is, since I have been acquainted with its optical appearances. If a pulp affected to no very great degree, by this intrinsic calcification be viewed by transmitted light, and a magnifying power of fifteen or twenty diameters, it is found preternaturally opaque, especially in the centre: where the calcification is deeper in degree, the opacity is greater, and the limit between the clear edge and the opaque axis more obvious. In fig. 4 is represented one of the pulps taken from the tooth shown at fig. 1, magnified eighteen diameters. The clear margin is unusually broad, and the calcified

Fig. 4.



One of the pulps form the specimen represented at Fig. 2, exhibiting the calcified axis, and uncalcified surface, Magnified 18 diameters.

axis is very marked and exactly defined ; the margin of the calcified axis is very opaque and black, while along its absolute centre there is a certain amount of luminosity. In all degrees of calcification, excepting the final change, the outer layer of the pulp is seen to be transparent.

In attempting to view the entire pulp with higher powers—say forty diameters—its opacity is found so great that little can be made out without previously rendering it clearer by the application of chemical reagents. For this purpose, I have usually employed acetic acid and solution of caustic alkali, but principally the latter. Acetic acid renders the whole very clear, but developes the nuclei and blood-vessels, especially the former, to a degree that causes some confusion, and, by its action on the earthy deposit, produces an evolution of carbonic acid gas, though this occurs to a degree much less than would be imagined. Caustic alkali, however, has no objections; it renders the whole brilliantly clear, exhibiting the calcific deposits, and the nerves—the latter with great beauty and brilliancy.

[TO BE CONTINUED.]

MEMOIR ON THE LOSS OF THE TEETH.

BY DR. ROSSI, PARIS, 1852.

[TRANSLATED FOR THE RECORDER.]

Continued from page 80.

3.—Arrangement of the Teeth.

When the second dentition has not been regular; when a skillful hand has not been called to remedy errors which nature often commits, and which it is always possible to prevent or correct, this irregularity in the arrangement of the teeth may be the origin of their decomposition.

The teeth are often within or without the usual circle instead of being regularly placed at the side of each other. These haunts for food, resulting from this vicious arrangement become laboratories in which destructive acids are formed. We will state here

briefly that teeth having cavities hollowed out on their approximal surfaces become dangerous neighbors, because they hold destructive agents in contact with the teeth which they touch.

We have nothing further to say about the arrangement of the teeth and of the importance of this predisposing cause; when it favors the sojourn of aliments, it thus becomes a means of destruction. The natural separation of the teeth is a fortunate distribution, because it does not permit the accumulation of alimentary detritus.

4.—Traumatic Lesions.

They may render the destruction of the teeth easier by depriving them of their covering of enamel, and above all by giving them a form which retains aliments. But as this cause is rare, and as moreover it seldom occurs except upon the molars already attacked, although it may not be apparent, we only mention it to render our list complete.

SUMMARY.

We have completed the study of the causes which destroy the teeth. We have made every effort to avoid useless prolixity in the discussion, or in the examination of facts, in order that the mind might embrace, without being distracted, and at a single glance, so to speak, the whole of the theory. We desired above all to be clear and precise. The reader only can decide whether we have succeeded.

We will sum up what precedes, by a few general considerations.

We have just seen that the destruction of the teeth attributed to a pathological cause termed *caries*, is due only, in reality, to a chemical action of the acids which exist in the humors of the subject, which arise from the putrid or acetic fermentation of aliments, or introduced into the mouth already formed.

That the teeth, an epidermic product, are not penetrated by a single vessel, by a single nerve, and cannot modify themselves physiologically in such a manner as to be exposed to a morbid condition.

That persons from a superficial observation have readily been

caused to think for a time that the molars, in particular, sometimes decayed from within outward, for nothing exteriorly indicated the presence of even a considerable cavity already existing in the interior.

That, however, a more minute, attentive examination will always discover, it such an instance, an opening, a funnel filtering the alimentary detritus upon the ivory through the layer of enamel.

That the interdentiary spaces favored the accumulation and sojourn of this detritus.

That it was there in fact that the teeth were usually attacked.

That the form of the teeth, as well as their arrangement, was sometimes a condition of great importance.

That the action of predisposing causes should be regarded as very important in this process of destruction.

That the lymphatic temperament predisposes to their loss, as the ossification of the teeth is less compact and resisting.

That the union of all these causes or the action of a few only, concurred to their disorganization.

There still remains for us to give a reason for certain facts which the pathological theory cannot explain. The study which we have just completed furnishes us the means, and the influence of the *unique cause* the only one which destroys the teeth will be more clearly demonstrated from it. We will set forth these facts under the form of propositions which we will discuss one by one.

CONSEQUENT PROPOSITIONS.

I.—The superior incisors decay; the same teeth of the lower jaw remain sound.

II.—The superior central incisors of an arched form often decompose on their external surface.

III.—The superior lateral incisors are sometimes attacked on their internal surface.

IV.—The superior canines resist oftener than the incisors and superior bicuspids.

V.—The superior bicuspids are often destroyed when all the other teeth remain perfectly sound.

VI.—The first molars are oftener destroyed than the other molars, the wisdom tooth excepted.*

VII.—The molars decompose by their approximal surface, the superiors generally in mature age having remained sound until then.

VIII.—The inferior molars are sometimes destroyed in aged persons by their external surfaces and at the neck.

IX.—The superior wisdom teeth are often decomposed by their external surfaces, the inferiors by their grinding surfaces.

X.—The inferior wisdom tooth is oftener destroyed than the superior.

WE WILL DISCUSS THESE PROPOSITIONS.

I.—The superior incisors decay, the same teeth in the lower jaw remain sound.

The buccal mucus is in constant contact with the superior incisors; the saliva with the inferior incisors. The buccal mucus is acid, very acid under the influence of certain temperaments, of some morbid conditions. The saliva on the contrary is alkaline. Alimentary detritus readily remains in the interstitial spaces of the superior teeth while it is constantly diluted and carried away below and anteriorly, for this is the most dependent part.

The mucus then acts upon the superior, the saliva upon the inferior incisors, the former to destroy, the latter to preserve. Alimentary detritus may exhaust its action on the upper teeth, it has none on the lower, for it cannot sojourn there but a short time, and not long enough to ferment. This is the cause of this exception, apparently so strange.

II.—The central incisors of an arched form often decompose on their labial surfaces near the neck. We have exposed in detail the causes of this decomposition, in treating of the form of the teeth; we refer the reader to it. (See page 79.)

III.—The superior lateral incisors are sometimes attacked on their posterior surfaces. There is often upon this surface, a conical depression or deep crevice in the enamel. It is an anomalous form frequently met with. As there is in this

* The bicuspids are classed among the molars by our author.—TRANS.

case no contiguity but only an imperfect contiguity of the enamel, the imbibition of fluids to the dentine is favored by the phenomenon of capillary attraction.

IV.—The superior canines resist better than the incisors or the superior bicuspids.

This is a problem of form. Their approximal surfaces are rounded, in place of being flat, like the incisors and bicuspids, they touch their neighbors only at one point, the sojourn of alimentary detritus in the spaces which separate them is thus rendered more difficult.

V.—The superior bicuspids are often attacked or destroyed when all the other teeth are perfectly intact.

This proposition needs some explanation.

The bicuspids are the first to serve in the trituration of food. They have but one conical fang, whereas the molars have three above and two below. The solidity of these teeth is not very great, not to be compared with the molars.

Teeth have a movement in their sockets, and it is the more marked when they are less firm, less strongly held.

Well then! It is one of two things; either the bicuspids of the subject have a hard enamel, or the enamel is slightly ossified, friable. If it is hard they would wear away by rubbing, and a little flat facet will be found at the place of their contact. If it is friable, on the contrary, it would be ground in a measure from the movement in mastication and the point of contact will present a surface of a dull white color at first, if early examined, like the point of a transparent marble that has been carefully struck. The enamel is here crushed, it has lost its molecular arrangement, its disintegration intensifies the energy of the acids which act upon it. Now alimentary detritus begins its work with the aid of the buccal mucus which is in much greater quantity when the approximal surfaces of these teeth are flat in their whole extent, large and separated only above near the gum.

VI.—The first molars are oftener destroyed than the others, the wisdom tooth excepted.

The first molars are formed about the third year, and are erupted about the sixth. At the epoch of their formation the child

is more lymphatic than in after years. The teeth too are not so well ossified, they are softer than those which form subsequently. Lastly, their grinding surface presents a vast number of furrows and eminences and the numerous funnels formed by these multiplied folds retain the alimentary detritus. They absorb readily and by such a number of points that it is not uncommon to see the grinding surface blackened and almost the entire surface at once a prey to chemical destruction.

VII.—The molars (especially the superior) until now sound, often decompose by their approximal surface in mature age.

Projections of the gum, festoons occupy these interdentiary spaces. These festoons disappear at the time when the gums begin to recede and lay bare the teeth; their place is then occupied by aliments which remain there, ferment and decompose the approximal surfaces. These teeth are flat, very large, deprived of enamel above, near the neck where the ivory of the fangs is already exposed. Destruction may make great inroads before it is suspected and the individual complain of acute pain when the eye and the probe cannot yet fix the cause.

VIII.—The inferior molars are sometimes destroyed in old age by the external surface and near the neck.

This decomposition occurring in old persons is a singular form which has for a long time occupied our attention because it escaped a satisfactory explanation. This decomposition of the external surface near the neck is frequently met with on the inferior molars. They are excavated in such a manner that the crown is often nearly detached from the fangs and the havoc seems to be arrested at the line where the enamel terminates whilst it keeps advancing in depth. The tooth appears as if sawn by a very thick saw.

What was the cause of this phenomenon? Why did chemical agents act here in so exceptional a manner? What were they? Questions often resolved in our mind and never solved. Finally we were put on the right path, and under these circumstances:

An old man whom we had known for many years, who had had excellent teeth all his life, a few years since lost an inferior molar every six months from the effect of this strange decomposition.

On questioning him about his health, on the medicaments he had employed which might occasion it, we learned that he was subject to a catarrhal affection of the throat of very frequent occurrence, that he made an almost habitual use of sweetened drinks. The sugar was a sufficient cause up to a certain point, but why did it destroy in preference the lower molars on the external surface near the neck?

We discovered after much questioning, gropingly directed and by one of those accidents of conversation which sometimes casts a ray of light, that he ordinarily kept a bit of lichen or other pastes in his mouth in order to diminish the cough he is afflicted with.

There was now no longer any doubt; he allowed these sugared and mucilaginous pastes to remain and melt slowly between the cheek and the neck of the inferior molars; their action was expended there and these teeth covered by solid enamel which had persisted until then, endowed with a resisting, well ossified tissue, only allowed themselves to be destroyed below the enamel, about the neck where the ivory was bare as is the case when the gums have receded.

Enlightened by this observation, we had the greatest desire, as one might readily imagine, to confirm it by other instances whenever an opportunity might offer. We now feel sure that the explanation of the fact being due to the presence of sugar, in all the so-called pectoral pastes, is perfectly correct. Our brethren who have frequent occasion to observe this can verify its truth.

IX.—The superior wisdom teeth are often attacked by their external surface, the inferior often by their grinding surface.

The superior wisdom teeth are often erupted with an inclination outward towards the cheek. In this position their external surface often becomes nearly superior. The cheek rubs against the external border, causing aliments to accumulate upon this surface above the border, and it thus resembles on account of its obliquity, the bottom of any vessel. You can predict the consequences of such a disposition.

As to the inferior molars, they remain a long time beneath the gum, but only partially covered. Substances pass under this sort of cap and when the grinding surface is fairly unmasked, it ap-

pears brown, infiltrated, decomposed; sometimes the tooth is nearly destroyed. It is one of the grossest errors to suppose that it was attacked before eruption, that is to say, before it had pierced the gum at any point whatsoever. Such an occurrence never takes place, for the simple reason that it is impossible.

X.—The inferior wisdom teeth decompose oftener than the superior.

The difficulty which these teeth experience in eruption, the length of time occupied in accomplishing it, the almost insurmountable obstacle which the ramus of the inferior maxilla opposes to them, retains them in a large number of cases, several months, several years in the worst physical conditions. During this period folds of inflamed gum surround them and form a kind of pit above their grinding surface which alone is visible; alimentary detritus can lodge there without the point of the tongue being able to dislodge it.

The superior wisdom tooth on the contrary, advances more radidly, and does not encounter any of these obstacles, any of these delays, and is less exposed to destruction than the inferior.

The applications of the theory which we have exposed can be multiplied; but the true cause of the decomposition of the teeth once known, it is easy for every intelligent man to explain the thousand and one modes in which this cause acts. Based upon it, every fact explains itself clearly and naturally. We therefore stop here, feeling assured that we have done enough by indicating the path.

CONCLUSION.

The destruction of the teeth being due to chemical agents, as we have already shown, there are many ways of opposing these agents. 1. By preventing their formation. 2. By the administration of substances which neutralize them. 3. By placing the parts most liable to decompose in a more favorable condition.

The formation of the most active acids is prevented by not allowing the alimentary detritus to sojourn and ferment, by discontinuing the habitual use of aliments, drinks or particular condiments which give origin to them.

Many substances retard, arrest putrid fermentation: others, alkaline, neutralize the action of the acids. Such may enter into

the preparations of daily use, selecting them with care according to the subject and his particular condition. It is sometimes useful to employ them as a gargle, as a topical application, &c.

Various operations are also of great service, some are indispensable, before the employment of any other means. They should always be performed by a skillful hand, for any portion of the tooth once taken away is never reproduced, and time cannot restore the blunders committed by an unskillful practitioner.

But we propose as the subject of a second memoir, the examination and criticism of all the proper means for the preservation of the teeth and arresting their destruction. The absolute theory we have put forth as an exact expression of the truth, throws, you perceive, on all practical questions a new light; and ought to modify the means employed, the operations practiced up to the present time. There are some of them so unreasonable, so wanting in judgment that we shall abandon them. We will submit something new to the intelligence of our worthy colleagues. We do not wish to be understood, however, to say, that all which skillful proctitioners have done and still do, is condemnable and injurious; this is far from our thoughts. Still, we avow, that it must be very difficult for those who live in complete ignorance of the cause which destroys the teeth, to do just what is required, only what is required, and all as it should be done.

This important question with the development it admits of.—But it was indispensable in the first place, and above all, to establish this truth, by which we will terminate, a truth, the results of which are so vast. The *destruction of the teeth is owing to a* CHEMICAL cause, *and not due to a* PATHOLOGICAL *cause, to a disease termed* CARIES.

Science and art properly directed, offer numerous and efficacious resources to prevent, combat and arrest this destruction in its march.

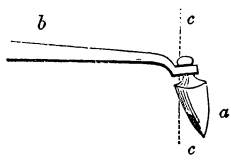
This last proposition will be, we repeat, the subject of a second memoir.

THE END.

HONSINGER'S ROTARY GUM LANCE.

In the practice of dentistry, it should not only be the aim of the operator to obtain and use instruments which may work with ease and exactitude, but also those which may relieve the patient of pain to as great an extent as possible. The principal object of dread to the patient, who is about to have a tooth extracted, is the separation of the teeth and gums. Many who have come to us, have said: "Don't cut the gum; we would rather have the tooth remain." Every one seemed to have a righteous horror of having the gum touched. It therefore seemed a matter of much necessity to us, that there should be an instrument contrived which should at once separate the tooth from the gum, and at the same time cause the patient no suffering.

After considerable study and experiment, we brought out the instrument, an illustration of which is here given. It is called the Rotary Gum Lance. It consists of a long and tapering steel



shank, [b] inserted in an ivory or silver handle, as may suit the maker. To the curved end of it is attached the lance secured by a swivel, and so hung, as to turn easily in the socket. The pivot is thrown back from the convex surface of the lance, throwing the whole blade out at a small angle with the perpendicular [c c]. The shape of the lance is concavo-convex, thus allowing the concave surface to fit closely to the tooth, while by the motion of the hand the blade follows round the tooth, the edge nicely and easily separating the membrane from the tooth and without inconveniencing the patient to any extent. Many have asked us, as we have taken the forceps in hand, "Why, Doctor, have you cut the gums?" The fact is, the lance does not cut the gum in the least, but *separates* the membrane from the tooth without interfering with the gum, and thereby allowing the tooth to be drawn clean. The chief beauty of this lance is that it separates the posterior and anterior surfaces with the same facility that it does the lingual and buccal surfaces, thereby avoiding all laceration of the gums. The throwing back of the pivot from a straight line with the lance

tends to keep it in whatever position it may be used, at the same inclination with the perpendicular [c]. If, indeed, the pivot were on a line with the blade, it must easily be seen that it would be impossible for it to turn and at the same time follow the surface of the tooth. In Fig. 2 we have a side view of the convex surface by which the attachment of the pivot [d] and its inclination with the blade of the lance may be more easily perceived. The lance manufactured by us is a trifle narrower than the one in the engraving, and is better fitted for the molars and dentes sapientiæ, while one still narrower would be better suited for the cuspids, bicuspids and incisors.

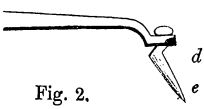


Fig. 2.

We have used this instrument now for a sufficiently long time to test its value and practicability, and never, in any instance, have we known it to fail. It has universally given satisfaction, both to the patient, and to many dentists also who have examined it and seen it work, and we now give it to the profession, hoping that it may prove of as much value to them as it has to us. A short time after we made the instrument, we were requested by a celebrated manufacturer of dental instruments in Albany, to let him take it and manufacture them for sale. We declined, preferring to give the profession the benefit of its use first. Since that time, engagements and other delays, incident to business, have prevented us from making the requisite arrangements for bringing it before the public. The instrument is very simple and easy of construction, and should be in the hands of every dentist. Any one can see it by calling at the rooms of Dr. E. Honsinger, No. 77 Lake Street, Chicago.

PROCEEDINGS OF THE SWEDISH SOCIETY OF PHYSICIANS.

At the meeting of November 23, Herr Santesson presented to the Society a woman aged 38, who had suffered from phosphorus-necrosis in the upper maxillæ, and he communicated the following history of her case:—The patient of tolerably good bodily constitution, but a cachectic appearance, was under treatment for the space of a month during the preceding spring in the surgical

wards of the Seraphim Hospital, for necrosis in both superior maxillary bones. She then stated that she had been engaged since the year 1844 in a lucifer-match manufactory in Stockholm, where her duty consisted in dipping the sticks. She was thus occupied in the same room in which the matches were subsequently dried. Though she had been employed in this manner for many years, she had not observed any alteration in her previously good health until the fifth year, when she first began to feel languid and weak, to have mists before her eyes, and to suffer from loss of appetite. But as she, notwithstanding, persevered in her work, her symptoms gradually increased, until she was obliged in spring to leave the factory in consequence of debility. Until about two years before, her teeth were perfectly sound, but she then began to feel tenderness in the upper row, and at the same time observed that the teeth, from being white, by degrees altered in color, and became ash-grey. The gum at the same time began to wrinkle, to separate from the alveoli, and to contract towards the upper lip. Some time after, a small abscess formed over the right eye-tooth, which subsequently opened, and from which pus was from time to time discharged. In the commencement of the present year (1852) she began to lose her teeth, of which the first pair of incisors first fell out. On her admission into the Hospital at this time, the second pair of incisors, a canine tooth, and the first pair of molars, all of which were loose and rattling in her mouth, impeding both speech and mastication, were removed. A part of the edge of the alveolar process was, at the same time, likewise taken away, but without embracing all the affected part. During the course of the summer, the disease progressed, so that when she was admitted for the second time into the Hospital, on the 21st of September, it was found, on inspection of the cavity of the mouth, that, in addition to the above-mentioned loss of teeth, the greater part of the alveolar process of both the superior maxillary bones was necrosed. The gum felt hard and shrivelled and presented a pale appearance. The breath was offensive, and the discharge from the diseased parts was considerable. Resection of the affected bones was performed on the 4th of October, when the anterior part of the horizontal portions of the upper maxillæ and a portion of the septum

nasi, were removed, exposing the inferior spongy bones and both antra Highmoriana. Herr Santesson intended, at some future time, when the granulations should have filled up as much as possible, to apply to a mechanical Dentist for the purpose of procuring a hard gum for the patient. He referred to a case of phosphorus-necrosis in the lower jaw, which he had about two years previously brought before the Society, and to the history of the disease he had then given; he had recently seen in the fourteenth volume of the "Dublin Quarterly Journal of Medical Science," an article on the subject by Mr. Harrison, who had observed in a large lucifer-match factory, in the neighborhood of Manchester, 14 cases of this disease, and he (Herr Santesson) remarked that, in the case under consideration, a chronic poisoning, manifesting itself in impaired digestion, weakness and numbness of the extremities, seemed to have preceded the local affection; also that nature did not in this case of necrosis as she usually does in others, attempt any reparative process with a view of replacing the lost parts.

Herr Ekströmer remarked that it was likely that less care was taken at the lucifer-match manufactories in Stockholm, as two cases of necrosis had already occurred there, while, according to Herr Skoldberg's report, in the great factory in Jönköping, where about three hundred persons, mostly children, are employed the manufacture under consideration did not seem to have any injurious effect upon the health.

Herr Sprinchorn mentioned that amorphous pulverulent phosphorus had recently been introduced into commerce, and was said to be both less dangerous in the way of causing fire, and less injurious to the health than the ordinary kind. The mode of preparing it is still kept a secret.

Herr Carlsson had not seen the factory at Jönköping, but he suspected that its favorable sanitary condition depended on judicious preventive measures, as washing, defined and shorter hours for those departments of the work which are regarded as most injurious to the health, due ventilation, etc.

Herr Santesson remarked that Mr. Harrison states that the sickness was diminished from the time the drying room was isolated, and consecutive employment in dipping the sticks restric-

ted to two hours. It is remarkable that many people can work for a number of years in the factories without being affected with the disease, and that those who previously had bad teeth appear to be most liable to it.

Herr Ekströmer promised to procure for the Society, from Herr Sköldberg, some further particulars of the manufactory at Jönköping.—*From the Medical Times and Gezette.*

FOREIGN BODY IN THE ŒSOPHAGUS.

[To the Editor of the Medical Times and Gazette.]

Sir,—The publication of the case of œsophagotomy, or pharyngotomy, in your Journal of the 9th inst., has induced me to send you a brief report of an accident which fell under my own observation a short time since, and where a similar operation might have become necessary, had not the abstracting body descended before the symptoms resulting from its impaction had become very imminent.

On May 2, 1855, I was consulted by Mrs. D., aged 30, who stated that, during the preceding night, in her sleep, she had accidentally swallowed a piece or plate, containing three artificial teeth, corresponding to the outer incisor, the canine, and first bicuspid. The accident appeared to have been occasioned by this piece having been affixed to a faulty tooth, and thus being too easily detached.

Notwithstanding the inconvenience and suffering thus produced, she had walked to my house, in order, if possible, to get the substance removed. It had passed too far down either to be seen or to be felt by the finger. She referred the sensation produced to a point behind the upper part of the sternum. On having recourse to the probang, I manipulated very gently with it, and after a little time, succeeded in passing it down the œsophagus, hoping that it had carried the extraneous body before it into the stomach, especially as she thought herself much relieved. I prescribed for her a little soothing and aperient medicine.

On the following morning she came to me again, stating that she still felt as if there was some obstruction in the part. On having again recourse to the probang, I met with resistance, near

the upper part of the œsophagus, but, after a short time, it again passed, inducing us to hope that the obstruction was now removed.

On visiting her at her own residence, two days afterwards, she stated that, from her own sensations, she believed the substance had not really descended into the stomach until the following night after she had called upon me the second time, and on the succeeding day it was discharged through the bowels.

On examining the plate, I found the teeth had not been attached to gold, but to an inferior metal, to lessen expense I suppose.

Except a little soreness in swallowing for a few days, she suffered, I believe, no further inconvenience.

I am, &c., JOHN WINDSOR, F. R. C. S.
Senior Surgeon of the Manchester Eye Hospital.

65, Piccadilly, Manchester, February 14, 1856.

A REMEDY FOR SPRINGING OF PLATES.

BY AUGUSTUS B. SMITH.

I have noticed that there are many articles written upon the Springing of Plates, in the different dental works, and it may appear to some to be but presumption to offer anything new upon the subject, unless it is something that is simple, convenient, and perfect. I will not claim mine to be a sovereign remedy, but leave others to practice and judge for themselves. My plan is the following:

When the case is ready to imbed in the mortar, to line and solder, I form my frame work to it in such a manner that when it is encased, the frame will only be one-eighth of an inch from the teeth. The frame work is made in this manner: Take three pieces of annealed iron wire, say about No. 16, and five or six inches in length; lay these side by side, and twist or braid the ends together, so that the wires or strands in the centre may be spread open and remain in the position you desire them. This is bent to fit around the anterior side of the teeth, one strand to be near the cutting edge, one the centre, and the third at the base or fang of the teeth. One frame of this kind may last to solder fifty cases, by simply bending with the fingers to suit the size of each case. When all is ready, I heap the mortar upon a small

thin board kept for this purpose; place the case upon it, press it down, or jar the board which will settle it gradually, until the mixture between the case and board is very thin, or till the plate at the heel either touches the board, or nearly so. I then draw the frame as near the teeth as possible without touching them. When the envelope is sufficiently set, I trim off the superflous plaster, till the wires become exposed. This you perceive leaves but a very thin covering around the teeth. With a thin knife-blade, or what is still better, as not being so liable to scratch the plate, one made of stiff sheet brass or German silver, I divide the plaster into two equal parts, commencing between the central incisors at their cutting edge, passing over the alveolar ridge and following the medium line back to the palatal edge of the plate, cutting carefully down to the plate or nearly so. After the teeth are lined, and ready to heat up, I pass a single wire across the heel of the case, and fasten to the ends of the frame. This gives additional strength, and sustains more surely the plaster in its proper position during the soldering.

My reasons for adopting this plan are few and simple:

1st.—Plaster of Paris heated up to the degree of heat sufficient to solder a case, will shrink about a quarter of an inch to every three inches. It is easy to understand that this has a great tendency to take with it, as far as possible, so yielding a substance as a red hot plate.

2nd.—The more of an unshrinkable substance that can be used in connection with the plaster, and still be strong enough for the purpose, reduces the difficulty. Every dentist finds by practice, that half sand and half plaster by measure is that proportion, but this does not fully obviate it. By dividing it in the manner spoken of, reduces it altogether or nearly so. Each side acting independently of the other, cannot, as if it were whole, draw itself inwardly and warp the plate.

3rd.—Having so slight a covering around the teeth, makes it easier to solder, the heat not being conveyed away so rapidly as if more substance were used, and of course the less body, the less will be the shrinkage. I believe the great difficulty in springing of plates lies principally in the plaster instead of the metal.

New Haven, Conn., April 18, 1856.

ERRATA.—On page 118, 13th line from top, for *medium* read median.

EDITORIAL.

CORRESPONDENTS, SUBSCRIBERS, EXCHANGES, &c., are requested to direct all Communications relative to the financial or business departments of this Journal, to "SUTTON & RAYNOR, 609 Broadway, N. Y.;" and articles for publication, books for review, exchanges, reports of society meetings, and all correspondence belonging to the editorial department, to "EDITOR OF DENTAL RECORDER, 139 Fourth Avenue, N. Y."

"Whoso shall dare these boots displace,
Must meet Bombastes face to face."

In the April number of the "News Letter," we find an article headed "Sponge Gold," written by J. H. McQuillen, and commencing as follows:—"In a recent communication published in the "Dental Recorder," commenting upon the report of the committee appointed by the Pennsylvania Association of Surgeon Dentists, to ascertain the value of Sponge Gold as a material for filling teeth, the writer has drawn inferences that were unwarrantable in the premises, and labored under misapprehensions which, if not replied to, would be calculated to place the Society and its committee in an invidious position."

Whether it is by the authority or with the approval of the aforesaid committee that the author of the above makes his appearance as "Bombastes Furioso," is a matter concerning which we are most profoundly tranquil.

We are in like manner affected by the charges above quoted. Our young friend it would seem, had to "speak a piece," and select a subject, consequently somebody had to *suffer*, and as we find ourself no worse off than the rest of his *readers*, we shall do as they do, say nothing and hope for the best, or at least for something better next time.

Were we to republish in full Dr. McQuillen's article we fear our subscribers would not readily forgive or forget the lack of attention to their interests that would there by be evinced. Hence, we content ourselves by making only the "*opening*" extract, which certainly sets forth the intent and purpose of its author, and as his *article* may fall into the hands of some who did *not* see "the report," and our "comments" upon it, and who *may* see this, we think it well enough in order to show its utter destitution of truth and reason, simply to state that the report alluded to was published in the "News Letter," and *republished* in the Recorder, together with the comments we made. How "unwarrantable inferences" made under such circumstances could place "the Society or its committee" in an "*invidious* position" we can't tell. Quien sabe!?

We do know, however, that our confidence in the ability of the dental profession to read and understand *correctly*, the English language, is sufficiently well based to enable us to say without fear of contradiction, that Dr. J. H. McQuillen's services as *interpreter* are unnecessary, and his intrusion of them unwarrantably presumptuous.

The remainder of the article alluded to is taken up by remarks concerning fillings, failures, &c. Had the author been endeavoring to *prove* the statements contained in "the comments," (which annoyed him so much,) we should have pronounced his paper a success. Unfortunately for his case, his deductions are all in behalf of the report, while the facts are with us. Need we add any expressions of resignation?

Our author winds up his article by an attempt or so at sarcasm; whether his very moderate success in this direction is to be attributed to lack of material or ability, are questions the solution of which we leave to the committee he has so *ably* defended. We hope, however, that he will not be discouraged. Our profession needs contributors to its literature, and Dr. McQuillen, as a writer, possesses merit. We may be laughed at for making the statement, nevertheless we believe it, and it becomes our *duty* to state our belief; as it is our *pleasure* to make public our determination to second his laudable efforts to establish an enduring fame, whenever the circumstances will permit.

Pennsylvania College of Dental Surgeons.—It will be seen from our advertising columns that Philapelphia is not to be without a College. A new charter has been obtained, mainly, we believe, through the exertions of Dr. E. Townsend, to whom the profession certainly must feel indebted for the new addition to the facilities thus afforded those who desire to be of us and with us. With the exception of Prof. J. D. White's chair, which is to be filled by Prof. Townsend, the Faculty is the same as that of the former school, and it will doubtless commence where its predecessors left off, i. e., in the flood-tide of prosperity.

Hand's Text-Book of Anatomy.

A notice of this work has been crowded out of the last and the present number of the Recorder. It will appear in the next issue.

New-York Dental Recorder;

DEVOTED TO THE THEORY AND PRACTICE OF

Surgical, Medical and Mechanical Dentistry.

Vol. X.] JUNE, 1856. [No. 6.

PROFESSIONAL WEAKNESSES.

BY A. A. B.

No profession can possibly hold a respectable position in the world, whose individual members fail to respect each other, or who disregard the high degree of honor which should ever be found to characterise their intercourse.

We have been induced to think of this subject from having become acquainted with a victim, by the want of courtesy, indeed it may be said of honesty, in the conduct of some members of our profession towards him, and to whom I would address a few remarks.

In the first place, I would speak of the practice of slanderously talking of neighboring practitioners, either in relation to their ability as dentists, or as men.

With this a gentleman can have nothing to do; it cannot enter into any portion of his necessities, or interests; it can neither elevate him in the mind of his hearers, nor can it add one particle of ability to his capacity; it can attach no glory to his name, no credit to his reputation; cannot even relieve the bitterness of a bad nature, nor ease a heart sore and guilty. Therefore it is a deadening occupation, utterly beneath a calling whose aim is usefulness, whose aspirations are noble and exalted. Unbefitting a profession that can boast of members beloved for great powers, great hearts, and a high order of intellectuality; of such men as labor night and day for the promotion of our science, the elevation of our standard, for the whole good of our professional body.

The man who can listen to the detraction of a co-worker in our ranks, without a blush of indignation towards the perpetrator of the wrong, is, indeed, a sorrowful spectacle of a mistaken and misguided man. One who will have to wrestle, in mighty strength, with a monster who leaves a slimy track in the foot-prints of its victim; one whose career through life will be bowed down with an oppressive load, whose solitary path will be cheered by no friendly voice, whose future is like a dark and fearful cloud suspended before the star of existence.

But he who can slander another, with whom he has no acquaintance, merely from jealousy, is, indeed, a weak creature, claiming the pity and contempt of all: a dirty infection, ulcerating the vitals of his profession, loathed and shunned by all honorable members.

We are, unfortunately, subjected to a nuisance in many respects, that is fast levelling the practice of dentistry to a mere craft, which the other professions are not in the least infested with;—*that is a system of underbidding.*

Physicians have established prices for their practice throughout whole communities, regulated by local association. Dentists have all prices at all times.

The consequence is, that a fair price for skillful operations, is seldom obtained, only by an exception to the general rule. One operates for five dollars a filling, others for four, three, two, and so on down to fifty cents, each claiming to do the best, all managing to secure this infatuation in some of each community. This is still worse in the mechanical department, some constructing full sets for $250, others for $25, the low price operators kidnapping from the higher, so that patients, with a few exceptions, are induced to go about *shopping* for operations as they do for wearing apparel; *small* dentists becoming Jews in good earnest, varying in price from a large sum to a mere song.

Here we have reached the battle ground; men who are skillful, require an equivalent price for their art, those of inferior grade, regulate their prices accordingly, and cry *extortion* to the more gifted man; for, of course, every professional man knows, that there is as much difference in the *operations* of dentists as there is in school boy sketches with Raphael's master-piece, as

wide a difference in workmanship as there is exhibited in a penny watch and in a Gurgensen's best chronometer. Yet to applicants for dental services, who cannot but imperfectly judge of these things, there is no important difference, as they are led to believe in most cases. That between Dr. Toodle and Mr. Wright, the only difference will be found in Dr. T—— asking a fair living price for his services, and Mr W—— commanding an extortion from a presumptive position "that perhaps the real, solid truth is there is no more preference to be had," than will be found in securing a cherry ripe and a cherry red.

True, persons often learn from sad experience, that they have been deceived, and that there is a material difference between good prices and good operations, and low prices and low operations. Justice is sorely cheated, for the very fact of these patients seeking better operators in the end, secures the inferior one from exposure which is richly due him, as no gentleman who is a good dentist, will be found wasting precious moments in idle corrections of inferior persons, or in commenting upon conduct he is compelled to blush for.

Every man, however gifted, will fail sometimes. It is unavoidable, our operations being at times purely speculative.

The early career of all men, however noble their aspirations, must be characterised by the style and power of the novitiate; the first years of practice, are those of intense toil and doubt, crowned by failure as often as success, until struggling labor asserts her indomitable influence, and we find the novice grown into the skillful dentist. But the result is this, these errors, useful in themselves, as they force improvement upon us, are turned, by the weak members of the profession, to their advantage, and used as everlasting proofs of great incompetency, for in their hands they never become things of the past, but always monsters of the present.

It is often asked, why this state of things is not improved?—Why have we not more general societies and local associations?

The reason appears to reside in the facts, that there is so great a preference to become a lion, rather than a useful dentist, to rule in a circle whose limits circumscribe one's house and office, rather than serve in the ranks of a profession struggling to rise

to its true position. The fear of losing some advantage by exchanging experiences, or of finding a level beneath the self-loved and self-constituted standard; a selfish satisfaction in finding a business sufficiently lucrative to supply individual wants, leading to a careless regard of a profession that generously offers a handsome support to all deserving industry; perhaps a fear that personal intercourse would force the abandonment of secret practices to the disadvantage of their neighbor, and to their own fancied emolument.

Should these surmises be correct, what unfortunate interpretations of self-interest, of that sphere of usefulness which should be the aim of every man, of the means to reach a great ultimate advantage, and which must greatly tend to stamp the significance of weakness upon the calling.

Elevate the profession and you infinitely advance yourself, add to its advantages, and you increase your own usefulness in a tenfold degree, extend its application, and you will have found an inexhaustable El Dorado.

[TO BE CONTINUED.]

FROM VELPEAU'S SURGICAL CLINIQUE.

[Translated for the New-York Dental Recorder.]

THE ABNORMAL DEVELOPMENT OF THE INFERIOR WISDOM TOOTH.

Among the numerous and often very serious accidents of which the mouth may be the seat, there is one, the cause of which has been for a long time unknown; and is produced by the development of the wisdom tooth.

We have at present an example in our wards, and I will not allow this opportunity to pass to speak to you of it. The patient, a strong, vigorous and healthy young man, was attacked some weeks past with very acute pains in the right side of the jaw, and in the back part of the mouth; pain accompanied by a considerable swelling of the cheek, and an impossibility to separate the jaws; he had also a painful enlargement of the sub-maxillary

ganglia. Not being able to assure myself of the condition of the organs in the mouth, it being impossible to separate the jaws, I endeavored, at first, to calm the inflammatory symptoms by applying leeches to the angle of the jaw, emolient cataplasms, foot-bath, diet, &c.; he was then able to separate his jaws a little. I tried to increase it by aid of a wedge of wood, placed between the first molars, which I forced, more and more, backwards, gradually increasing the opening; I succeeded in this manner, effecting a sufficient separation to examine the condition of the parts situated in the back part of the mouth; I then discovered the cause of all the trouble: there was a fungus ulcerated tumor back of the second inferior molar, covered with vegetations, in the centre of which could be felt, with a probe, a hard body, which was probably the wisdom tooth. With the point of a bistoury I laid open this little tumour in several directions, which was nothing more than the mucous membrane of the gum, hard, thickened, fungus, ulcerated, and furnishing a sanious pus of a infectious odor. The wisdom tooth was then entirely exposed; from the following day the pain completely ceased, the swelling about the molars gradually diminished, and under the influence of alum gargles all the fungus subsided and disappeared, and in a few days the patient found himself completely disburdened of all his symptons.

The disorders produced by the development of the inferior wisdom tooth, were very little known before the interesting works, published on this subject by Mr. Toirac. These difficulties may be seated in the upper as well as in the lower jaw, by the development of the last molar; but they ordinarily take place in the inferior maxilla, and they are much more serious than in the superior.

The wisdom tooth which most ordinarily appears from the 18th to the 25th year, often comes forward much later and sometimes even at a very advanced age. Mr. Toirac had the opportunity of examining the head of a woman deceased, at 103 years of age, whose mouth had been free from teeth for a long time before her death, which was evident from the total obliteration of the alveolar processes; but, singular to observe, on one side of the lower jaw there existed a tooth which would shortly have been erupted.

Such are without doubt analogous to facts which would have caused some anatomists to speak of a third dentition.

The development of the inferior wisdom tooth leads to accidents when there is not a sufficient space between the second molar and the base of the coronoid apophysis; or, where there is, however, sufficient space, it advances. 1. In a vicious direction, that is to say, obliquely from behind, forwards, and it is arrested in its eruption by the second molar. 2. From without, inwards, to the side of the tongue in such a manner as to impede the free movements of that organ and excoriate it. 3. From within, outwards, so that the crown advances and penetrates the substance of the cheek. 4. When it advances and rests partly inclosed in the coronoide apophysis. 5. Lastly, when the posterior portion remains covered by a cushion of gum; this last was the condition of the patient we have just treated here, and which I reported to you in the commencement. I could, observes Mr. Toirac, still multiply these abnormal positions of the wisdom tooth, and annex to them a great number of cases in their support; but all can with some slight modifications be brought to the five kinds I have just established, it will suffice me to pass them in review, not omitting to attach to each one the history of the malady which resulted.

Obs. I.—The wisdom tooth advancing obliquely from behind, forwards, the crown of which presses against the neighboring tooth which opposes its further eruption. Madam R——, a young woman, 22 years of age, experienced three or four months after her marriage, a dull pain at the angle of the inf. maxilla on the left side. The pain soon extended itself to the median line; all the teeth were painful, but for which she might have compared her sufferings to the tooth ache. Some months having elapsed, this condition continuing and the pain becoming from day to day more acute, rheumatism was suspected, and various curative measures were employed; at first anti-phlogistic treatment:—diet, leeches, cataplasms, baths, demulcent drinks, etc. were ineffectually employed. They then had recourse to dry alkaline frictions without changing the intensity of the pain. Lastly, in view of acting more directly, they deemed it advisable

to place a seton in the neck, which they kept there for a month. Without stopping to mention the employment of sulphate of quinine, Meglins' pills, acupuncturation, and a host of other remedies, which were tried without any greater success. Madam R—— after a consultation of physicians, was sent to a watering place. Returning to Paris, a constant prey to the most cruel suffering, Madam R——, accompanied by her father, came to consult me, without any hope, as she since told me, of finding any relief, which she seemed to have renounced for a long time. The state of the invalid was growing worse daily. When I saw her, her countenance was pale and wire-drawn, excessive emaciation and no appetite. The calm of night seemed to increase her despair and she groaned and wept aloud. The teeth carefully examined, were sound, white and regular; the gums, in all their extent, were of a pale red. Nothing indicated the eruption of a wisdom tooth. I directed my researches, however, in this direction. With this view I practised a sufficiently deep incision on the gum with a curved bistoury, behind the second molar. On the introduction of a little probe, I discovered a hard and very smooth body, around which, I could pass the instrument, except in front, where it was arrested. I was soon convinced that there was a tooth directed from behind, forwards, whose crown pressing against the neighboring molar, was arrested by it.

An anatomical specimen in my possession and which presents the same disposition, strengthened me in this idea; therefore the next day I did not hesitate to perform, in the presence of the former physician of the invalid, whom I had called in consultation, the extraction of the second molar to favor the advance of the wisdom tooth. Gradually the symptoms disappeared; and five or six days after the operation, Madam R—— ceased to experience the least pain.

M. Esquirol, to whom M. Toirac communicated this observation related to him that a lady attacked with madness had been brought to his asylum, and that he had restored her to reason by aiding the eruption of a wisdom tooth by a crucial incision.

In order to understand thoroughly all the difficulties occasioned by the wisdom tooth, it is necessary to observe, that when a tooth appears on the border of the gum, the fang has not yet acquired the

length which it will eventually have. And it is in proportion to the formation of the fang that the crown becomes more and more exposed until it has reached exteriorly its natural height, similar in a measure to a spiral spring whose fixed point fastened in the jaw, developes itself by extending its coils upwards. The fact is, that in a normal condition, the fang does not *lower* during development; in a word, they grow from the *interior* (*below upwards*) *to the exterior;* from whence it follows, that if the crown of a tooth while advancing finds a sufficiently strong obstacle to arrest it in its eruption, the fang, constantly elongating during the progress of ossification, must necessarily determine a pressure towards its inferior extremity, by occupying a place which is not prepared nor intended for it by nature, and the nerves and other sensitive parts which enter into the structure of the dental pulp are compressed. This admitted, one easily conceives the nervous accidents that a wisdom tooth may occasion, which sometimes finds itself partially encased in the coronoid apophysis, or simply arrested by a thick callous cushion of gum, through which it cannot force itself, or in directing itself obliquely fowards and thus coming to buttress against the neighboring molar.

Obs. II.—The wisdom tooth advancing from without, inwards, to the side of the tongue, and determining there an ulceration of a syphilitic appearance.

Case. M. M——, late officer of artillery, aged 45 years, residing in the country since 1815, came to Paris to be treated for the venereal disease, an affection which he had contracted during his campaign, and of which he believed he had been badly cured. Several months back he had perceived an ulceration on the left side of the base of the tongue, which rendered all the movements of that organ very painful. Mastication especially was sometimes so painful that he was obliged to rise from the table without being able to eat. Mercurial treatment to which he was submitted by one of the most distinguished physicians of the capitol, far from curing the evil, augmented its intensity: the tongue after fifteen or twenty days of this treatment, tumefied to such a point as to fill the whole buccal cavity. The gums were engorged with blood, the breath fœtid and the teeth loose;

the mercury was entirely suspended, and the mouth at the end of a short time, was in the same condition as when M. M—— quitted his residence. It was at this epoch that he presented himself at my house to have his teeth cleansed, which were overladen with tartar; he spoke to me of his complaint and related to me what I have just stated. After having forcibly depressed the tongue to the left with a spatula, I actually perceived at its base an ulcer, much resembling those generally attributed to syphilis, its circumference was swollen, uneven, of a dirty grey color. I was often obliged on account of the nausea it occasioned the patient to suspend my explorations, which were on this account very imperfect; it was only after frequently recommencing these trials and allowing M. M—— to rest from time to time, that I succeeded, after a long examination, in discovering on the square portion of the maxillary bone, at about six lines from the posterior opening of the dental canal, a hard body covered by a portion of loose gum which hid it from view. I raised up this sort of excrescence and discovered a lump of tartar which I readily loosened with a curved scraper. Beneath it was a white body, this was a portion of the crown of a badly formed wisdom tooth. This tooth advancing in an abnormal direction and coming in contact with the base of the tongue, had alone caused the malady in question. Embarrassed by the tongue and the frequent nausea which the patient experienced, I in vain endeavored in several trials, to extract this tooth, it broke under my forceps, the only instrument I could make use of in this case, but happily in such a manner that the portion of fang which remained was not in contact with the tongue. I saw M. M—— some days after, he was entirely cured.

You see from this observation, that for want of a thorough examination, which from the susceptibility of the invalid was exceedingly difficult, M. M—— had been uselessly placed under a treatment which had evidently injured his health and agravated his complaint.

[TO BE CONTINUED.]

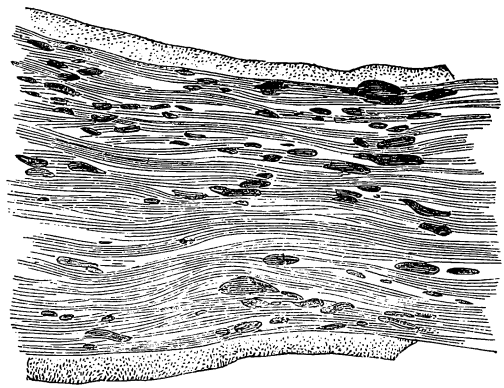
INTRINSIC CALCIFICATION OF THE PERMANENT TOOTH-PULP (as constantly associated with Dental Caries).

BY S. JAMES A. SALTER, M. D., F. L. S., ETC.

[Continued from page 103.]

In fig. 5 is represented a portion of a tooth-pulp, from the fang of a slightly carious molar tooth, treated with solution of caustic potass, and magnified forty diameters. It exhibits very well the appearances characteristic of the calcific change in an early condition. Running along the pulp are seen very numerous nerves, in bundles of various sizes, with clear intervals between them; and scattered throughout the whole promiscuously, excepting for a small space at each margin, are multitudes of small bodies, for the most part of a lenticular form, with very decided and dark boundary outline, lightening off to a brilliant centre; the long axis of each being uniformly the same as that of the pulp. These are the "calcification islands."[a]

FIG. 5.



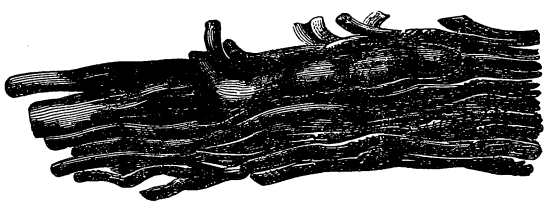
Pulp from the fang of a slightly carious molar tooth, treated with caustic alkali; exhibiting the outer surface uncalcified, and numerous calcification islands in and among the nerves in its axis. Magnified 40 diameters.

The appearance of these bodies is very peculiar, not only from their form, but from their extreme darkness of outline—remind-

[a] I have thought it well to call these "calcification *islands*" in contradistinction to the other form, "calcification *globules*" (their analogues), met with in primary, and the other two forms of secondary dentine.

ing one strongly of oil-globules or bubbles of air in fluid—and arising, as in them, from the very different refracting power of the object and the material in which it is placed. So much do these bodies resemble bubbles of air (as seen by low powers), that at first I concluded they were such, and that their peculiar form was caused by the direction of the tissues in which they were found. But this was a mistake. Upon examining pulps in which a very deep impregnation of calcareous matter has occurred, with the same reagent, one finds traces of the original structure more and more obliterated, and the whole field of view is seen to be full of the calcification islands more or less fused together, giving an opaque blackish or clouded appearance, in which little can be made out beyond a general longitudinal direc-

FIG. 6.



Calcification islands, in the last stage, previous to complete fusion; united longitudinally, but laterally separable. Magnified 200 diameters.

tion. The extreme of this condition is represented at fig. 6, taken from the fang of a very highly calcified pulp. Here all residue of previous tissue was lost, and the mass consisted of adherent calcification islands in which the adhesion was closest in the longitudinal serial direction, giving a coarse fibrous aspect.

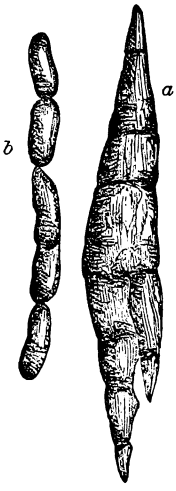
It must be observed that the outer surface of the pulp is never the seat of this process, excepting just at last, when the secondary dentine becomes confounded with the primary; one always sees the outer limit clear and transparent, as long, that is, as the pulp can be readily detached from the cavity. The distribution of these calcified islands through the pulp is liable to some variety, but I have usually found them most abundant in those portions near the extremity of the fang, and in the mass occupying the large chamber in the crown of molar teeth; and it is in these regions that we most frequently find the calcification ad-

vanced to its complete issue in the production of osteodentine, and that more especially in the former. In the neck and summit of the cusps, this change occurs late; I have one specimen in which the cusps are altogether soft and unchanged, while the central mass is in a state of complete calcification.

I will now proceed to the more precise consideration of these calcification islands, in reference to their *form* and *structure*, their *chemical* and *physical characters*, and their *relation to the tissues among which they are found.*

I have already spoken of these bodies as being lenticular in form, and this is by a great deal their most frequent shape; they are most frequently lenticular or elliptical, occasionally a true oval, and very rarely round. A form which is not unusual is represented at fig. 7 *a*; it is evidently composed of a linear series of islands partially fused together, the lines of union being still distinct and the whole constituting a long ellipse. Occasionally one finds true cylinders, even throughout, tolerably straight, and with truncated extremities. Sometimes they are found in linear series, but not fused together, as seen in fig. 7 *b*. A very frequent form may be described as club-shaped cylinders, with rounded and very slightly bulbous extremities. They always show a great tendency towards a longitudinal series, and they fuse more firmly end to end than laterally (fig. 6). The size of the islands varies almost indefinitely, from the smallest perceptible microscopic object to others the $\frac{1}{50}$th of an inch in length; the size, moreover, seems very little to affect, if at all to alter, the forms of the islands, for the same shapes may be recognised, and in about the same proportion, in the smallest as in the largest. When viewed with low power, the outlines of the islands seem tolerably even, but when examined with higher powers, the outline is frequently found irregular, from the fact that, as a rule, all, except the most minute, are composed of numerous smaller ones, more or less fused and adherent together. This compound character is not always seen even in some of tolerable magnitude, but in the largest it is most marked; in these

FIG. 7.



Occasional forms of calcification islands. Magnified 200 diameters.

one sees clearly the outlines of the smaller islands, not only at the edge, but deep in their substance, and by altering the focus, lines of partial and imperfect union are developed, very like those seen in primary dentine, where the globules have imperfectly fused. When perfectly fused, the outlines are lost, and the whole, retaining the original form of the pulp, becomes hard and semi-transparent, as in the specimen represented at fig. 3. I have already remarked that this calcification, up to a certain extent, causes a peculiar stiff elasticity of the entire pulp, and it is remarkable that this physical character, general through the whole pulp, should be produced by the distribution of isolated particles of a very different physical nature. The calcified islands are individually perfectly hard and unyielding, and break with brittleness when subjected to much pressure.

Chemically, these ossified masses consist of an animal basis and earthy salt, soluble in muriatic acid, and are probably analogous to ordinary dentine in this respect. When treated with acetic acid they are not much acted upon, but yield only a portion of their salts with the evolution of gas, which appears in the form of air-bubbles among the fluid of the specimen. When treated with hydrochloric acid the action is far more energetic: the whole of the earthy matter appears to dissolve out, leaving a peculiar cartilage-like residue of much firmness, and retaining the exact form of the original island, neither more nor less; it is clearish, and altogether destitute of the dark, highly-refracted outline visible in the object previous to decalcification. I have never succeeded in making out, either in the original or the decalcified islands, any laminæ, tubes, or other histological forms; but this would necessarily arise from the peculiar optical difficulties that exist: a small isolated, very dense mass among tissues of great tenuity would scarcely yield indications of its own structure.

The relation of these islands of calcification to the tissues in which they are found is the most remarkable feature in this subject, and is likely to be of no small physiological value in reference to the whole subject of calcification of soft structures. I have already enforced the fact that the calcification (by globules) of primary dentine and the other two forms of secondary dentine takes place in a soft tissue formed from particular cells,

and normally adapted and intended as the recipients of such impregnation; but in the structure we are now considering the case is far otherwise; here we have an organ, the tooth-pulp, consisting, besides cells and nuclei, of connective-tissue, blood-vessls, and multitudes of nerves; and we find the whole of these structures swallowed up and obliterated by the calcification process. I have just stated that by the removal of the earthy matter with hydrochloric acid a form of animal matter identical with the previous calcification island is left, and this is the case with the smallest as well as the largest: *the addition of the earthy matter is in no way insterstitial.*

The best power to examine these bodies in relation to the other tissues is that magnifying 200 diameters; and for this purpose the application of caustic alkali is a very necessary preliminary step.

It is found almost impossible to isolate the calcification islands from the tissues in which they are found; and their intimate relation with the nerves is very remarkable; and easily demonstrated, from the fortuitous circumstance that the reagent necessary to clarify the object renders the nerve-structures only more distinctly visible.

Fig. 8.

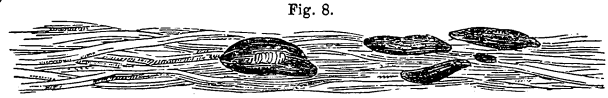


Fig. 8.—Calcification islands in the body of a compound nerve; the nerve-fibres in no way displaced or bulged out by their presence. Magnified 200 diameters.

Fig. 9.

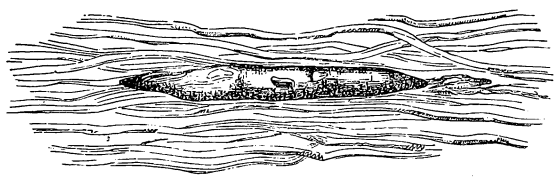


Fig. 9.—Calcification islands (produced apparently by the fusion in linear series of three smaller ones) in a compound nerve, from the pulp of a carious tooth; a single nerve fibre being, as it seemed, involved in the calcarious particle.* Magnified 200 diameters.

The islands of calcification are very numerous among the nerves, and are seen on the edge of bundles of nerves, and in all parts

* The author regrets that this figure has not been accurately rendered by the artist; the calcification island is on a plane too superficial, and the course of the central nerve-fibre into it is not so clear as in the original.

of the axis. The nerve fibres do not seem in any way pushed aside by their presence, for we see them of considerable size in the axis of a compound nerve without any bulging of its surface or edges (fig. 8). The relation of the individual nerve-fibres it is not so easy to demonstrate; still (though I am not disposed to commit myself to the unqualified statement), I believe I have frequently seen a single fibre pass into the very axis of the calcification island on one side and leave it on the other, being lost and obliterated for that space in its course. Such a specimen I have figured (fig. 9), and the only source of fallacy one can imagine might arise from the nerve passing below the calcification island on a different plane, and so be covered up by it; but this I do not believe. What is more unmistakeable, and convinces me that the nerves do really sustain the calcific impregnation, is what is seen in the advanced stages of that change. One very frequently sees a considerable bundle of nerves, entering, so to speak, a dense semi-fused mass of calcification islands and leaving them further on in their course, the nerves having the ordinary and normal structure up to and in contact with the calcified mass, which obviously holds exactly the position previously held by the intermediate portion of the compound nerve. What has become of that compound nerve for that interval, unless impregnated and obliterated by the calcification process? I can conceive no other explanation of these appearances than by imagining that the change pervades the tissues promiscuously and without elective choice. I do not consider that the inability to demonstrate nerves in the decalcified mass in any way militates against this doctrine: the calcification process is not merely an addition of earthy salts to the animal mass; the latter is altered at the same time.[a]

Frequently, though the calcification be far advanced, a single nerve-fibre can be traced for a considerable distance; the same with small bundles, but never, as far as I have seen, with large.

The cells and nuclei, which are seen pretty numerous in the

[a] Kolliker, while speaking of the evidences to be obtained from the examination of decalcified bone, remarks: "that everything which thus presents itself, in an isolated form, is not necessarily a morphological unity." The converse of this may be said with equal truth—that because a hystological element, which is supposed to enter into the animal basis of a calcified mass, cannot be isolated from the same decalcified, it does not prove the original non-existence of that tissue.

substance of the adult pulp among its vessels and nerves, undoubtedly share in the general change, and probably the former produce the few dentinal tubes that are found in osteodentine.

Of the change produced in the blood-vessels I cannot speak with much accuracy, but they seem to share, to a certain extent, in the general change. If we examine a section of perfectly-formed osteodentine (Pl. I, fig. 2), the few blood-vessels in the axis of the dentine haversian systems are seen certainly much less numerous than those in the original pulp, and even some of these, as I shall presently show (Pl. I, fig. 3), become obliterated by calcification. I have, however, frequently seen them, of quite healthy structure, when almost every trace of the other tissues has been lost. Upon treating a tooth-pulp with rather dilute acetic acid, I have followed the vessels among the calcified masses for a considerable distance, their coats exhibiting the characteristic nuclei with unmistakeable clearness, and quite unaltered. It seems that the blood-vessels, the larger ones at least, undergo the calcific change at a late period.

We trace the process of calcification readily enough up to a certain point—where the islands are still separable, and not wholly fused together: we readily pick abroad small fragments, and examine them as moist specimens: it would be physically impossible to make sections for dry mounting, and we require, moreover, some clarifying reagents to make the specimen intelligible.—When, however, the calcification is absolutely complete, we find a firm coherent mass capable of being reduced to sections as thin as normal dentine, and displaying appearances which are recognised as osteodentine.

It is not my intention to give any detailed description of the anatomy of osteodentine, as it is so generally understood and described in works of anatomy, &c. There are, however, some points in its structure which have never been noticed, and which are of interest not only for themselves, but as throwing light upon, and being explained by the changes I have been describing.

Osteodentine may exist in any number of systems, and the amount of pulps involved does not appear to affect the maturity at which a partial calcification may arrive. In fig. 1, Pl. I, is represented a section made near the apex of the fang of a carious

bicuspid tooth, containing one, and only one, perfectly formed dentine system, the rest of the pulp not being affected.[a]

Osteodentine has fewer tubes than any other form of dentine, and is consequently very transparent: this transparency does not altogether arise (as does that of dentine of repair) from the filling up of the tubes with secondary deposit within them; many of the tubes are doubtless so filled up, as is the case with all dentine formed in states of tooth-irritation or inflammation, but they are nevertheless really less abundant, and that is the true cause of the peculiar transparency. This circumstance is quite intelligible upon the idea that all the tissues of the pulp share alike in the common change: in this case doubtless the calcified nerves and blood-vessels and connective tissue would not develope tubes, but only those elements of the pulp which are similar to the cells on the surface of the pulp constituting the "membrana eboris."

Osteodentine is described, as consisting of systems of dentine around isolated blood-vessels; and so it generally is, but occasionally and not very infrequently, indeed, the central canal can no longer be seen; it is obliterated by the calcification of the blood-vessels, and its position occupied by an indefinite clear structure. Here the last of the soft tissues of the pulp is swallowed up by the calcific change. (Plate I, fig. 3.)

Again, a tissue resembling dentine is not the only result of this process. Under certain peculiar circumstances, I have found the pulp converted into crusta petrosa: the peculiar circumstances which appear to be connected with this change being a preternaturally abundant communication between the pulp and the periosteum—the communication being large and short, so that the pulp and the periosteum are almost continuous. I have[b] elsewhere exhibited specimens illustrative of this circumstance, without, on that occasion, drawing any general inferences from them. In these instances, by means of erratic vascular canals, the communication between the pulp and the periosteum was very direct and abundant, and in each there was a development

[a] For this specimen, I am indebted to the kindness of my friend, Mr. Walter Jones, of Worcester.

[b] 'On Erratic Vascular Canals in teeth, associated with the Development of Bone in the Pulp-cavity.' ('Trans. Path. Soc.,' vol. v.)

of bone in the cavity. A still more remarkable example of this condition I found in a carious temporary molar tooth, which had been retained in the mouth till eighteen years of age. In this instance the fangs had been somewhat absorbed, especially on the inner surfaces, so as to lay open the pulp cavities to near the main chamber of the tooth, and moreover the canals were considerably enlarged: by this means the pulp and the periosteum were almost as one. Upon making a section of this tooth across the crown at the line indicated in the figure of it (Plate II, fig. 1), the pulp was found converted into a mass of crusta petrosa and dentine confounded together: there were many vascular canals among it, but these were mostly ground out in the process of making the specimen: they appear to communicate with the principal one, which is still visible. The laminæ were numerous, and of the character of those found in ordinary cement: the dentinal tubes were tolerably, though not very abundant, and the two tissues were entirely confounded together. There were also numerous interspaces among the tissue, the result of the imperfect fusion of the calcification islands.

I have made this specimen the subject of an accurate figure (Plate II, fig. 2).

These observations on the calcification of the tooth-pulp, and the particular relation of the calcific change to the tissues of that organ, are not without value in a practical sense, mutually explaining, and being confirmed by certain circumstances which arise in operations on the teeth.

There are two operations connected with the teeth, in one of which constantly, and in the other frequently, we have to do with the pulp cavity, and are influenced in our proceedings by the condition of the pulp itself. These are respectively *tooth-pivotting* and *stopping* or *plugging*.

In tooth pivotting, a gold or other pin is introduced into the pulp-cavity of single fanged front upper teeth, with the crown of an artificial tooth attached to it, after the crown of the natural one has been cut off for unsightly caries. But before adapting the artificial tooth it is necessary to prepare the pulp-cavity by means of a drill for the reception of the pin. In this process we have to do with the pulp in every varied stage of calcification, and the vital phenomena which it exhibits are exactly in accord-

ance with the degree of change. Where the calcification is slight the pulp is exquisitely sensitive, and the application of the drill produces intense pain; and in this condition it bleeds. As the calcification advances the sensibility and the tendency to bleed gradually and regularly subside, till at length in the completely formed osteodentine these indications of vitality have ceased altogether, and the calcified pulp may be drilled with as little inconvenience, as attends the cutting of a hair or nail. Sometimes, however, one finds, even in an advanced stage of calcification, an intensely sensitive spot in the pulp, and sometimes the point of the drill will be stained with blood in piercing it; but this is easily explained, by imagining that in the one case a nerve-fibre, and in the other a blood-vessel has escaped the common change. Still it must be stated, as a rule, that *the sensibility and the bleeding are inversely as the calcification.*

In plugging teeth it is necessary to cut away all the softened and carious dentine, and we not unfrequently reach the calcified pulps, when all the phenomena I have just described similarly display themselves.

The calcification process I have now been describing must certainly be considered as a morbid change,[a] though in effect a reparative one; it occurs in disease, and as its result, but when complete, obviates the ill effects which would ensue. It thus falls under the category of those many processes, which although essentially morbid, are the means of averting a condition which would be fatal to the individual organ affected. This process finds its counterpart in those many conditions in which irritation and increased vascularity, the result of disease in contiguous structures, issue in the deposition of adventitious matter: in this instance the adventitious matter is determined by the normal nutritional affinities of the organ. It furnishes, moreover, an interesting example of a qualitative disturbance of nutrition resulting from a vascular disturbance which would seem to be merely quantitative.—*Guy's Hospital Reports.*

[a] I cannot think that this change in a diseased condition in man is quite analogous to what we find in some of the lower animals in which osteodentine is normally formed. In them it uniformly commences at the upper extremity of the pulp-cavity, and is adherent to the primary dentine. One can easily conceive, that the pulp in these cases breaks up into compound papillæ, that on the *surface* of these the dentine is formed, while the nerves and vessels recede before it.

FORMULA FOR ALLOYING GOLD.

Of the various rules for alloying gold that have appeared from time to time, some are simple at the expense of accuracy, others correct but complicated. The following is simple and easily worked, at the same time as exact as the algebraic formula, of which it is only the verbal expression.

To find how much alloy must be added to a given weight (expressed in Troy grains) of gold, to reduce it from one degree of fineness (expressed in carats) to a lower :—subtract the lower carat (c) from the higher (C) ; *divide the lower carat by the difference* ($C - c$) ; *and with the quotient divide the weight of gold* (S) *to be alloyed ; the new quotient will be the amount of alloy* (x) *to be added.*

$$x = \frac{S}{\frac{c}{C-c}}$$

The following is the method of originating and reducing this equation.

The elements of an equation are to be found in the fact that in the mass before (S) and after ($S+x$) alloying, there is the same amount of pure gold. Now the expression of fineness by carats means that in every pennyweight there are so many grains (in 20 carat gold, 20 grains) of fine gold. Therefore for every 24 grains, contained in any given weight of gold, there will be 18, 20 or 22 grains of pure gold, according to its fineness. Hence the rule. To ascertain the quantity of pure gold in any weight of known fineness — *divide the weight* (S) *by* 24 *and multiply by the carat* (C).

In the mass of gold (S) which it is intended to alloy, before alloying, the total amount of pure gold is $\frac{CS}{24}$. After adding the alloy ($S + x$ it is reduced from fineness C to fineness c ; then the pure gold $= \frac{c\,(S+x)}{24}$: which two fractions, being different expressions for the same quantity are necessarily equal — therefore, $\frac{CS}{24} = \frac{c\,(S+x)}{24}$ Dividing by 24,

(1) $CS = c(S \times x)$ Transposing,

(2) $cx = CS - cS = S(C-c)$ Dividing by c,

(3) $x = \frac{S(C-c)}{c}$ Dividing numerator and denominator by $C-c$

$$x = \frac{S}{\frac{c}{C-c}}$$

Example 1, Reduce a double eagle (516 grains, 21.6 carats) to 18 carat gold. $21.6 - 18 = 3.6 : 18 \div 3.6 = 5 : 516 \div 5 = 103.2$, the amount of alloy to be added.

2. Reduce 4 English sovereigns (490 grains, 22 carats) to 20 carat gold. $22 - 20 = 2 : 20 \div 2 = 10 : 490 \div 10 = 49$ amount of alloy to be added.

Other rules may be formed by altering the arrangement of the terms of the right side of equation, No. 3.

e. g. $x = \frac{CS}{c} - S$ or $x = \frac{S(C-c)}{c}$ the latter is the easier to calculate; but both are inferior to the one above given.

Again, by finding the value of c in equation, No. 1.

$$c = C\frac{S}{S+x}$$

We have a rule for determining the fineness of plate (S) after the addition of a known weight (x) of alloy:

Multiply its carat by its weight, before alloying, and divide by its weight after the addition of the alloy.

This rule is useful where it is desirable to know the fineness of solders.

Example. — What is the fineness of the two following solders, (taken from Prof. Harris' work). (1) 2 dwts. 22 c. gold, 16 grs. silver, 12 grs. copper. (2) 1 dwt. 15 grs. 22 c. gold, 16 grs. silver, 12 grs. copper.

(1) 22×48 (2 dwts.) $= 1056 \div 76 = 13.9$ or 13.9 carats.

(2) 22×39 (1 dwt. 15 grs.) $= 858 \div 67 = 11.3$ or 11.3 carats.

DEATH FROM CHLOROFORM.

We have to record another death from the inhalation of chloroform. It occurred in Boston. The exhibitor, Dr. Emery, publishes the following statement of the case in the *Boston Journal*:

"Between the hours of 1 and 2 o'clock, on the 5th instant, I commenced to administer chloroform to Mrs. P. A. Morgan, at her request, for the purpose of removing some teeth. I commenced with a small quantity — should think from two to three drachms, on a sponge. She inhaled it without difficulty for a minute or two. Her pulse was not strong, but uniform. She then commenced to be excited, and said that I was going to extract her teeth, and she should know all about it. She said that Mrs. Paige (the lady who accompanied her) was getting the forceps to extract them with. I think about one minute had passed during this conversation and excitement. I then removed the sponge from her mouth, and in a few moments she became quiet, and satisfied that there had been no attempt made to remove her teeth. In a few moments I commenced the operation again, with the same amount of chloroform. She inhaled it without difficulty about as long as she did before, and became so much excited that she got up out of the chair, and insisted that I had extracted her teeth. She spit on the floor and looked to see if it was blood, and she insisted that some one was coming into the room whom she did not wish to see. I sat her down in the chair again, and she then went into a spasm, closed her teeth and breathed with difficulty. I sprinkled water on her face, and the muscles relaxed, and I asked her to get up and we would place her on the lounge. She made an effort to rise, and, with my assistance, stood on her feet, and then instantly sank to the floor. With the assistance of Mrs. Paige, I placed her on the lounge, and then there was a rush of blood to the brain. I sprinkled water in her face again, but she showed no signs of being couscious. Mrs. Paige went for assistance, and I immediately commenced artificial respiration by insufflation, and kept it up until Dr. Stedman came in, which was but a few minutes."—Medical News.

EDITORIAL.

CORRESPONDENTS, SUBSCRIBERS, EXCHANGES, &c., are requested to direct all Communications relative to the financial or business departments of this Journal, to "SUTTON & RAYNOR, 609 Broadway, N. Y.;" and articles for publication, books for review, exchanges, reports of society meetings, and all correspondence belonging to the editorial department, to "EDITOR OF DENTAL RECORDER, 139 Fourth Avenue, N. Y."

In the last number of the "News Letter," we notice an article advocating the importance of a charge or fee for examining teeth; in other words "a consultation fee." To this measure the senior editor objects The subject is one which has for some time occupied our attention, and in the next number of the Recorder we hope to find room for the expression of our views, as also the results of recent consultations with prominent members of the profession.

Our city is soon to be honored by the presence of the Dental Profession "en masse." The Dental Convention meets here in August. In our next issue we shall give some particulars of what the Convention is and is to be. Meanwhile, we surmise that Philadelphia will be largely and ably represented; our Philadelphia brethren are used to working together. They are thoroughly organized and will in all probability succeed in electing one of their number President, and will generally manage affairs to their own satisfaction, while we of New York will have an excellent opportunity of learning how all this is done.

A TEXT BOOK OF ANATOMY AND GUIDE IN DISSECTIONS. By Washington R. Handy, (pp. 810). Published by Lindsay & Blakiston, Philadelphia.

How few anatomical text books there are that from the beginning, excite the interests of the student. How much there is in their contents to confuse, distract, weary, and appal. It does indeed require an ardent love for his profession, combined with determination and rare powers of concentration to enable the learner to discover aught save dryness in this most important branch of his medical course. Works of the kind named above are too frequently mere collections or compilations of facts piled mountain high, with nothing to refresh, nothing to delight, but much, very much, to weary and disgust. How strikingly they remind one of "Whited Sepulchres," enticingly "got up" without, but within full of dead men's bones. That there exists no necessity for this unfortunate monotony, the work before us affords most convincing proof. We defy any one to read the first page without feeling that he has met with an interesting book, and a closer examination will do away with the fear of disappointment, which might by past experience have been engendered. In its arrangement it is eminently practical, and almost poetical. "The alphabet" and the "language of Anatomy" sounds oddly, but why is it not right? Why is it that Students of Anatomy are expected to thoroughly understand their subject before they have even looked into it? Men creep before they begin to walk, they learn their letters before they read, but Medical Students are expected to *know* a vast deal of anatomy before they begin to study it, and they *must* know a great

deal before they can *understand* what they study. Who then can wonder at the very general distaste for this branch of medical education, the anxiety to slight it, the reluctance to commence, or continue after having once entered upon it. This state of things is almost unvaried in this country. The faculties of our medical schools acknowledge it. Every teacher complains of it—every practitioner feels it and almost every work upon Anatomy adds to it. It was to obviate precisely this state of things as well as to satisfy the requirement of the dental profession that our author commenced his work and as he does every thing that he undertakes, completed it. We are disappointed in it—it is not characteristic—to be sure it is plain, simple, unpretending and reliable, both in matter and manner, but as we have said there is something of poetry in its arrangement. Perhaps very little, but we feel assured that there is less where that came from. We have known the author for years as a skillful anatomist, a hard student, an indefatigable thorough kind-hearted teacher, but "no poetry" did we ever dream of. We are, therefore, compelled to assume that this semblance to it is solely due to the aptitude, truthfulness, and simplicity with which he has laid out his subject. What could be more simple—more practical—more likely to interest the beginner than the introduction—commencing with that most interesting of all studies, *history;* the "History of Anatomy"—"general Rules for dissection"—"organization"—its analysis"—fundamental elements forming organization"—"fundamental elements preserving do."—"relations between the above classes of elements, fixed and determined"—"varieties in organization"—"varieties in animal kingdom"—"constituents of human organization"—"development of organization"—"anatomy"—its divisions.

Again, Part 1st. "Alphabet of Anatomy, or Elementary Tissues"—"their origin"—"their physical properties"—"vital properties"—"number." The remainder of this section of the work is devoted to a complete and interesting description of the different tissues, a chapter being devoted to each. This closes the "alphabet"—once comprehended (and it is a *pleasure* to do it) how simple, and yet how complete, wonderful and *interesting* does the language appear.

Part 2d. Is devoted to the head and is very complete, treating first of the bones; then of the active organs. It is particularly descriptive of the teeth, and this part alone makes the work—an important 'aye,' a necessary one to the dental student.

Part 3rd. Treats of the trunk, and Part 4 of the extremities.

We regret that our limited space will not permit a more extended notice of this work, which we cannot but think a very good one. It is admirably conceived, well written, and published by Lindsay & Blakiston. We can say nothing more in its favor though we will trespass by summing up our reasons for pronouncing it good. The language of our author is choice and to the purpose; he wastes no words; his readers no time. He commences with the most interesting and attractive part of his subject—its "history." He covers a great deal of ground with very few words, and yet keeps the student well prepared for what is to follow; nothing is touched abruptly. The subject discussed is complete in itself, but is necessary to a perfect understanding of what is to follow, everything is graduated. A firm and reliable foundation is laid, interest is excited, and before the student is aware that he has become such, the great stumbling blocks are surmounted. Again, after the elements have been conquered—there is variety. We find no hundred pages of "dry bones" to be followed by acres of muscles, miles of blood-vessels, or leagues of nerves; everything comes in its place with its proper connection and relations. Again, the book follows the subject as it lies on the table. The student has his section before him, he must make the most of it as well as economise his time.; we are no advocate of hurried dissections, but the more time we save in studying, the more we have left to devote to study, by saving half our time we can learn twice as much. 'Knowledge is power," time is allotted to us in order that we may gain knowledge.

We have but one defect in the book to notice. The wood cuts are coarsely done, they generally convey a correct idea of the subject illustrated, and are in this respect quite equal to the average, better than many, for the drawings are good, but would seem intended to be copied by the brush than the graver.

New-York Dental Recorder;

DEVOTED TO THE THEORY AND PRACTICE OF

Surgical, Medical and Mechanical Dentistry.

Vol. X.] JULY, 1856. [No. 7.

MUTILATION BY INDIA RUBBER LIGATURES.

The following statement, showing the result of a want of sufficient care in the treatment of a simple case of irregularity and a total absence of that knowledge which distinguishes a man of sound professional knowledge and judgment from a mere dental jobber, we place before the readers of the Recorder.

Case. A left central incisor closing within the lower teeth to be brought out in the mouth of a lad, aged 12 years. We give the father's statement: — My son made application to a dentist to regulate a crooked front tooth by bringing it out. The operation was commenced by the use of a plate. Subsequently the plate was removed, and on the 3d January, 1856, an india rubber ligature was placed around the two teeth—it was examined on the 4th and pronounced all right. The boy was taken sick with the mumps on Saturday, the 5th, and confined to the house several days (12th). The ligature disappeared two days previous, on the 10th. On the 15th the gum became inflamed and the tooth was elongated Went to the dentist, who, on examination, gave it as his opinion that no foreign substance was there, but pronounced it the effect of a cold. Four days following, on the 19th, it was much more elongated and the gums very much inflamed. I called again upon the dentist, who on examination still pronounced it the effect of a cold and *inflammation caused by cutting an eye tooth.* The inflammation continued to increase and the tooth to elongate up to the 27th January, on which day it was examined by another dentist, who failed to make a satisfactory examination on account of the high state of inflammation—he advised the

application of leeches; two were applied on that afternoon. The inflammation subsided, but after two or three days it greatly increased. The two teeth having protruded from their sockets nearly or quite one half the length of the crowns of the teeth, and *very loose*. Called again upon the dentist, who originally applied the ligature, who still pronounced it the effect of cold and advised extracting the two teeth. Objecting to such a procedure, we called upon Dr. ——, who upon examination gave the following opinion. 'I feel convinced from the appearance of the gum, that there is a foreign substance above the free edge keeping up this high state of inflammation.' His associate being called in without knowing what opinion had been expressed, gave the same opinion in most positive language. The lad was then at the request of the last gentleman called upon, sent to Dr. —— for his opinion, who also expressed the belief that a foreign substance might be there, but that the treatment in itself was sufficient to account for the appearances without the actual presence of the ligature, and that the two teeth could not be saved. Even with a delicate instrument the presence of the ligature could not be determined with any certainty. But the chief reason for confidently believing it to be there was the appearance of the parts and the festoon of gum between the teeth being cut off, showing that the ligature had at least worked itself above the necks of the teeth, and that it must now be still higher up if it had not broken, for from its elastic nature the tendency would be to assume to the smallest place, the apices of the fangs, and it was most effectually aided in this by the very considerable movement of the teeth in striking against their antagonists. Several eminent dentists being called in consultation and it being the opinion of one and the family physician also that the teeth could not be saved, and of all present that their retention was exceedingly doubtful, it was determined to be most advisable to extract the one for which there was the least hope, the central, and to give the other a chance. Two days previous to this, however, an attempt was made with a sharp lance to sever the india rubber and to draw it away.—This attempt was without any result, and the teeth were so loose and the parts so painful that nothing else could be done. It was suggested to put the lad under the influence of chloroform but

the family physician in attendance objected on account of his temperament and present irritable condition. The fang of the tooth was, on examination, found entirely divested of its membrane, except at its apex. The following day the lad presented himself, looking very cheerful and much improved in color. The ligature having come away from the socket of the tooth extracted that morning, and from its appearance it was evident that it had been severed by the lance. An impression was then taken in very soft wax which shows the elongation of the lateral incisor and the distance between it and the opposite central incisor. Since then it has been gradually growing firmer in its socket and advancing toward the central space, and there now remains little doubt but this tooth which might then have been extracted with the fingers with ease, will be retained and may become a permanently serviceable member. The eruption of the eye-tooth will push the lateral incisor into the central space, and the deformity will not be very marked. When the lateral incisor is broad the result of such an accident is not marked in a casual observation.

This, with many similar cases, less disastrous in their results, should make parents and those who have the charge of children exceedingly careful into whose hands they entrust organs so valuable and so susceptible of injury as the teeth. And it should also be a caution to men who are disqualified by principle, judgment and professional experience, not to meddle with what is beyond their knowledge to appreciate or understand, and their ability to correct or obviate.

REMOVAL OF STAINS OF NITRATE OF SILVER.

For this purpose the following solutions may be employed:—A solution of 8 parts of perchloride of mercury [corrosive sublimate], and muriate of ammonia in 125 parts of water; or 5 grs. of cyanide of potassium, and 50 centigrammes of iodine, in 45 grains of water.—*Journal of Franklin Institute*, from *Journ. de Pharm. d'Anvers.*

FORMULA FOR ALLOYING GOLD.

(Continued from page 141.)

For the convenience of those who dislike the trouble of calculation; or who, from want of practice, are liable to make frequent mistakes, we have prepared the following

TABLE OF DIVISORS:

Carat	22	21	20	19	18	17	16	15	14	13	12
24	11.	7.	5	3.8	3.	2.44	2.	1.66	1.4	1.18	1.
22		21.	10.	6.33	4.5	3.4	2.66	2.14	1.75	1.44	1.2
21.6		35	12.5	7.33	5.	3.7	2.86	2.27	1.84	1.51	1.25
21			20.	9.5	6.	4.25	3.2	2.5	2.	1.65	1.33
20				19.	9.	5.66	4.	3.	2.33	1.85	1.5
19					18.	8.5	5.33	3.75	2.8	2.16	1.7
18						17.	8.	5.	3.5	2.6	2.

The first left hand vertical column represents the fineness *from* which, and the first horizontal line the fineness *to* which it is required to reduce a given weight of gold.

EXAMPLES.—To reduce pure gold (24 *c.*) to 20 *c.* divide the weight (in Troy grains) by 5.: to 18 *c.* divide by 3.: to 16 *c.* divide by 2.: to 12 *c.* divide by 1, that is, gold and alloy equal parts.

To reduce English coin (22 *c.*) to 20 *c.* ÷ by 10.: to 18 *c.* ÷ by 4.5.: to find how much alloy to add for 14 *c.* solder ÷ by 1.75.

To reduce United States coin (since 1834, 21.6 *c.*) to 18 *c.* ÷ by 5.: to make 12 *c.* solder from same divide by 1.25.—To reduce scraps of 20 *c.* plate to 18 *c.* divide by 9.

In making solders from English or United States coin it must be remembered that the first is alloyed with copper alone, the latter with a mixture of silver 1, copper 3. It is, however, always best to prepare gold solder from chemically pure metals; since a slight variation in the proportions is apt to affect its "flow."

In preparing plate from foreign coins, their fineness must first

be known. In HARRIS' "Principles and Practice of Dental Surgery," or in PIGGOTT's "Dental Chemistry," will be found very useful tables for this purpose. We presume however that the majority of American Dentists will use either English (22 *c.*) or United States (before 1834, 22 *c.*—since 1834, 21.6 *c.*) coin.

Those not familiar with the use of decimal fractions will avoid all danger of mistakes, in using the fractional divisors of the table, by observing the following simple rule. Affix one or two cyphers to the weight accordingly as the divisor has one or two figures on the *right* of the decimal point, and then use the divisor as a whole number. EXAMPLES.—To reduce 516 grs. United States coin to 12 *c.* — 516 ÷ 1.25 = 51600 ÷ 125 = 412.8 grs.: to reduce the same to 20 *c.*—516÷12.5=5160 ÷ 125 = 41.28 grs. The figures of the divisor are the same in both cases: but the position of the decimal point, in the first, makes it $1\frac{1}{4}$, giving, as the alloy to be added, 412 4-5 grains; in the second, $12\frac{1}{2}$, giving, as the alloy, only $41\frac{1}{4}$ grains. To the reader familiar with decimals this explanation will, of course, be superfluous.

The following table may be found convenient for reference in the making of solders. It gives the fineness to which a *penny weight* of *pure* gold is reduced by the addition of from 1 to 24 grains of alloy.

ALLOY grs.	CARAT	ALLOY grs.	CARAT	ALLOY grs.	CARAT	ALLOY grs.	CARAT
1	23.04	7	18.58	13	15.57	19	13.40
2	22.15	8	18.	14	15.16	20	13.09
3	21.33	9	17.45	15	14.77	21	12.80
4	20.56	10	16.94	16	14.04	22	12.52
5	19.86	11	16.51	17	14.05	23	12.25
6	19.02	12	16.	18	13.71	24	12.

FROM VELPEAU'S SURGICAL CLINIQUE.

[Translated for the New-York Dental Recorder.]

THE ABNORMAL DEVELOPMENT OF THE INFERIOR WISDOM TOOTH.

(Continued from page 129.)

OBS. III.—The wisdom tooth advancing from within, outwards, and going to lodge itself in the thickness of the cheek.

Adelaide René, florist, aged 29 years, came to consult me the 23d of October, 1824, for a swelling which she had had for several months on the right side of the face. She had been directed to me from the "Hospice de Perfectionnement," by M. Velpeau, then chief of the Clinique of that establishment. There existed on the cheek at the portion corresponding to the wisdom tooth, a projection, resisting to the touch, very painful on pressure, becoming more apparent when the patient made a few efforts to open the mouth. I immediately suspected, and with reason, that this condition could only depend upon the last molar, the crown of which directed from within, outwards, penetrated the thickness of the cheek.

In fact, the finger passed backward, with precaution, in the mouth, discovered a tooth directed nearly horizontally, and entirely lodged in the muscles. If it had been possible to have extracted it immediately, the evil would certainly have been promptly cured; but, in addition to this the tooth was badly decayed, and it would certainly have broken under the instrument, and the swelling of the gum and the internal portion of the cheek, which was ulcerated, placed an invincible obstacle to this operation. Further, Adelaide René had a very small mouth; it was necessary, then, first of all, to dissipate the inflammation; but this was only solely *provoked* and kept up by the presence of the crown of the tooth, which acted here like a foreign body.

I proceeded as follows: I introduced, as gently as I was able, between the cheek and the dental arch, a bit of cork, hollowed so as to lodge the crown of the tooth, and of such a thickness as to present no projection. The introduction was not made as one might suppose, without considerable difficulty and without

occasioning very acute pain, which was much greater on account of the mucous membrane of the cheek being lodged in the largely excavated crown. This little apparatus attached by a string to the bicuspid, kept perfectly in place until the following day, when I saw the patient, who had, according to my directions applied to the affected side of the face a large emolient cataplasm, and held warm water constantly in her mouth, which she replaced from time to time with honeyed barley water, slightly accidulated with a few drops of lemon juice, in order to better deterge the ulcer. Twenty four hours after, the pain and swelling had greatly diminished; but it was not until the second day that Adelaide could open her mouth sufficiently to admit of the extraction of the tooth which had been the cause of trouble. I performed this operation with a hook (pied de biche) in drawing towards me.

This kind of deviation of the wisdom tooth, outwards, is often met with; but fortunately when the deviation is slightly prominent; all the evil is reduced to occasional bitings of the cheek during the act of mastication, so that the tooth does not become really inconvenient, and only compels a recourse to art when the crown becomes carious, and presents asperities which excoriate the neighboring parts.

Obs. IV.—The wisdom tooth advancing and being partly arrested under the base of the coronoid apophysis.

Joseph Boulangé, currier, was presented to me, Oct. 18th, 1825, by M. Jules Cloquet. His right cheek was swollen in an extraordinary manner, the tumefaction extended itself from the eyelids, which were infiltrated to the clavicle; his face and neck were studded with numerous cicatrices, resulting from abscesses, which had opened naturally, and which they had been obliged to incise freely, to prevent the pus from spreading everywhere, which took place so soon as its exit was arrested.

For more than twenty months the invalid could not open his mouth, and he could only nourish himself by broths and light soups, which passed through an opening resulting from the abscess of a superior bicuspid on the left side. There was also at three inches from the angle of the jaw, a fistula, from which ran

a large quantity of sanious pus, whose puffed-up edges were furnished with proud flesh of a bad character; lower down, on the neck, there was another. A stylet introduced in the first penetrated obliquely from before backwards more than three inches in depth, and was arrested by a bone which was denuded, and which I supposed to be the wisdom tooth.

Joseph B.'s health from the time of the invasion of this malady, became much impaired; he had emaciated considerably; his skin was cadaverous; he complained frequently of severe colics, nearly always followed by copious liquid dejections; above all, digestion had been very painful for some time, which I attributed to a mixture of the fetid pus with which his mouth was constantly filled, with his food. Every means had been employed to aid the opening of the mouth, and permit the extraction of the tooth which had caused the invalid to despair of relief for so long a time. I say with regret, I believe there does not exist any medical treatment, any topical application capable of resolving this kind of engorgement, when it is old and proceeds from similar causes to those which now occupy our attention.

Leeching freely, emolient and resolutive cataplasms, frictions with mercurial or hydriodated pomatums, vesicatories, compression, &c., &c., had been employed. I did not make trial of recurring to the same means, the idea struck me of employing a mechanical force to gradually overcome the resistance of the facial muscles; a very simple mechanical force, since for the first day it was nothing more than a piece of wood cut like the mouth-piece of a flute, that the invalid forced more and more between the teeth, in proportion as the tension of the cheek lessened.

So soon as the opening of the mouth was from six to seven lines, which may be attained in twenty-four hours, when the patient is not negligent in the employment of the means indicated, which should be kept up during the night, by the aid of a suitable bandage over the mouth, I then replaced the wedge of wood by slices of cork, which from its elasticity gradually increased the opening. If such a case occur during the winter, it is essential that the patient be kept warm; one must have been a witness to the influence of a low temperature on this class

of affections to form an idea of it; a cold and damp day, joined to a slight negligence on the part of the invalid, suffice to lose all the separation that has been obtained, should it be already an inch or more; the patient moreover suffers more during cold weather and only finds relief in keeping the mouth shut, which he does not fail to do if there is nothing to prevent it. By carefully following what has been indicated, a sufficient separation may be obtained at the end of three, four or five days, to examine the interior of the mouth and to operate. This treatment, which was employed on the individual who forms the subject of this observation, has always been perfectly successful with me, and since the month of October, 1825, when I employed it for the first time, it has never once failed to meet with the success I awaited. I succeeded in extracting Joseph B.'s wisdom tooth, which was, as well as its neighbor, loose and embedded in a large quantity of pus, conditions which facilitated their extraction.

Four or five days after this operation a sequestrum appeared, which I recognized as belonging to the base of the coronoid apophysis, and on which was moulded a small portion of the crown of the tooth, which is sufficient indication that its eruption was arrested by this bone. This is a case, as you perceive, to favor the eruption from in front, to sacrifice at a proper period, the second molar. Eight days after, a new necrosed portion of the dental arch showed itself, which after slight traction I easily removed. Since this epoch the swelling disappeared gradually, and at the end of twenty days, there only remained on the cheek, reduced to its ordinary volume, the cicatrices of which I have already spoken.

If, however, the tumefaction had persisted for a long time, which sometimes happens when the malady is of long standing, you should (after being assured that it is not kept up either by a carious tooth, or by the bone itself) have recourse to compression, methodically applied, by means of a bandage; a very few days will then suffice to totally dissipate it.

When the accidents, produced by the wisdom tooth, are abandoned to nature, they sometimes end in curing themselves, but it is not ordinarily until after a very long time, and leaving unfortunately, deep cicatrices. It takes place as follows: you see pass

by the fistulas which form themselves near the jaw bone, necrosed portions of the alveolus which surround the tooth; the tooth being no longer held, and becoming free in the mouth, is naturally cast out, and from thence all accidents cease: this is what M. Toirac had occasion to observe in the case of a peasant from Lizieux. The wife of a French marshal experienced the same accidents from the eruption of a wisdom tooth, and the malady lasted nearly four years.

M. Toirac has seen a young man twenty-five years of age, of an excellent constitution, affected for a long time with an enormous fluxion; near the angle of the jaw there was a fistula which permitted small portions of the alveolus to pass from time to time. The malady was judged to be scrofulous in nature, and was treated as such; an attentive examination of the parts proclaimed that it depended upon the vicious position the lower wisdom tooth had been compelled to take, for want of a sufficient space to lodge itself properly; so soon as it was possible to extract it the patient was cured.

Sometimes the accidents produced by the wisdom tooth are still more formidable. Here follows a remarkable case:

Obs. V.—M. J.——, aged 45 or 50 years, had been for two years a prey to every species of suffering. When he submitted himself to my care, the right side of his face was very much swollen, and covered with cicatrices resulting from the numerous abscesses which had opened upon it; the neck, tumefied to the clavicle, presented several fistulas with detachments of the skin; the mouth entirely distorted, remained partly open, which depended upon the deviation of the inferior maxillary bone, whose teeth did not articulate with those of the upper jaw. The general condition of the invalid was most alarming; above all, for about four months he had had a violent diarrhœa; and a fetid slime, mingled with pus, ran constantly from his mouth, which was received in a tin box filled with bran, so as not to overrun his linen and the apartment in which he might be. Finally, his breath became so fetid that they were obliged to separate him from his family and children; at this epoch they placed him in a hospital, which he left after several months sojourn, without

ameliorating his cruel condition. They even told his wife, without doubt to persuade her to regulate some family interests, that he was a lost man, and that if there was any operation to attempt it would be the amputation of the jaw. It was at this epoch, that he was introduced to me by the printer of the "Gazette des Hôpitaux," of Paris, who by chance had read the number which gave the analysis of my memoir on the wisdom teeth, and he supposed that the illness of M. J., a relative of his, might possibly depend upon an analagous cause.

M. J. presented himself to me feeble and debilitated, sustained in his tottering march by two persons who accompanied him. After a long and minute exploration, in which I discovered the presence of several hard and moveable bodies, I practiced a large incision in the mouth, in the midst of fungus flesh of a cancerous aspect, which entirely filled the affected side of this cavity; then it was easy for me, by the aid of suitable instruments, to make some investigations, and to extract a tooth, which was scarcely held in its socket, and which I recognized to be the wisdom tooth, which had developed itself in the base of the coronoid apophysis; the apophysis itself undermined at its inferior portion by a long separation, had detached itself entirely from the maxilla. This pathological piece, which I preserved, presents an incrustation corresponding to the crown of the tooth, which was there developed. Other loose teeth and fragments of carious bone, more or less voluminous, were also removed by means of incisions and slight tractions. After having well assured myself that there were no more foreign bodies present, a simple acidulated honey mixture was ordered as its only dressing. One thing which is difficult to account for, is the almost immediate passage from the hopeless situation in which the invalid was, to the most satisfactory state. M. J., enfeebled by long suffering, could as I have said, scarcely walk, and from Monday, the day of the operation, to the following Thursday, he had gained sufficient force to come on foot to my house, and the Monday following he had in a great measure recovered his health and natural gaiety. The diarrhœa had entirely disappeared, he digested his food well, still his mouth remained one-sided; but a properly adjusted bandage brought it back to its normal position at the end of one

month. At present M. J. bears only a simple depression at the joint corresponding to the lost bone.

Obs. VI.—The wisdom tooth advancing under an arch of the gum by which it remains partially covered.

Orage, formerly a bath waiter, had been subject, for a year after his left lower wisdom tooth had commenced to appear, to slight fluxions of short duration, For the past three or four months these fluxions returned oftener and were more and more painful; none of those which he had had so far were as painful as the last. When I saw him, his cheek, without presenting any very considerable volume, was extremely sensitive to the least pressure; deglutition, above all, was nearly impossible. A few days repose and an anti-phlogostic treatment sufficed to make these symptoms disappear in a great measure, and enabled me to examine the interior of the mouth. The tonsil of the side corresponding to the fluxion was tumefied, and the palate was very red. Behind the second molar could be seen the crown of the wisdom tooth, its posterior two-thirds covered by a large fleshy saddle formed by the gum, of a violet color, and slightly ulcerated. One can easily conceive that this portion being constantly compressed by the movements of the jaw, would be continually in a state of irritation, and according to the condition of the subject, there supervened an inflammation, which sometimes extended itself deep enough to give rise to the repeated fluxions which had so often attacked him.

This case, gentlemen, is very frequent in practice; but the accidents do not always confine themselves to simple fluxions, to an inconvenience, or a few pains, more or less acute during mastication; it sometimes results, in the end, in a swelling of the tonsils, which have to be excised, and anginas which resist every treatment. The following is an example:

Obs. VII.—Chronic tonsilitis kept up by the hindrance of the eruption of a wisdom tooth. Dr. Fiard was seized during his medical studies, with a sore throat, which lasted nearly eighteen months. The following is the statement which he, himself, has drawn up of his malady.

In the summer of 1821, says this physician, I was attacked with a slight pain in the throat. In November of the same year the right tonsil became the seat of a violent inflammation. Twenty-five leeches to the neck, sinapisms, &c., made it yield. The throat continued to be painful as before, and became perceptibly more so. Deglutition was very difficult. All imaginable means were tried in vain, until the commencement of 1823. The most distinguished physicians and surgeons of our school could not, any more than myself, recognize the cause, and give me the least alleviation.

Fifty leeches in two applications, repeated cataplasms, mustard pediluvia, drinks and opiate gargles did not in the least calm my condition. I refused an anti-syphilitic treatment which an illustrious surgeon wished to submit me to, as no antecedent made me fear a cause of this nature. I constantly examined the back part of my mouth, explored every day the seat of this pain; my friends and myself could only find there a swelling of the right tonsil. All my teeth were perfectly sound; they had never caused me any suffering; the integrity of the gums appeared perfect; in substance, they advised me to have my tonsil excised, I was nearly decided upon it, when in exploring with attention the back part of the mouth, I remarked that the left inferior wisdom tooth was wanting; in pressing against the coronoid apophysis, I experienced a dull pain. I could scarcely conceive that it could have any relation with the right tonsil, and with the right side of the throat in general. However, without any fixed idea, I lifted the portion of flesh which covered the posterior portion of the second molar, without causing any alteration in its color. I felt there a hard body, and overcoming the pain which I had caused myself by the introduction of this little sound, I became certain that a broad and very large tooth, perfectly erupted from its alveolus, lay very deep in the flesh. One could not be more sure of any discovery; I seized a bistoury and liberally incised the gum from behind and in front; the relief and disappearance of pain, were sudden; but the two stripes of flesh inflamed and color vegetated. The excision of the flesh became, however, indispensable; it presented sufficiently great difficulties; it was necessary to cauterise it several times with nitrate of silver.

Lastly, the exposed tooth showed me the utter uselessness of the preceding means, counselled and employed, and the unique cause of my long suffering.

In fact, gentlemen, you must have recourse to incision in such a case, that is to say, when the last molar tooth finds itself arrested in a measure by an overlapping of the gum. To be successful, this incision should be deep, and a small dossil of lint should be then introduced between the lips of the division, which should be partly pushed behind the crown of the tooth. This dressing is sometimes very painful, above all, the first day, but if it is neglected, it often happens that the operation becomes useless, and one then imagines it is necessary to sacrifice the teeth, which can be prevented by having the patience to make these dressings in a proper manner, until the tooth is well exposed.

PROFESSIONAL WEAKNESSES.

BY A. A. B.

(Continued from page 124.)

Exact an educational standard from your professional acquaintances, and you produce the highest order of moral and intellectual worth, with the most enlarged views of a generous and chivalrous practice.

Such a system would induce a rivalry of the more noble feelings, a contest for the most exalted art in the calling, as cultivated minds are ever tending to spheres of greater *usefulness*, to perfections, not only of a professional character, but to those pertaining to the mind and heart.

We would then find in our stated or occasional meetings, that courtesy which ennobles companionship, that instruction which expands from small items to large additions to practice, like the pebble falling on the bosom of calm waters, instead of the heartless form, the rapid enquiry and *boast*, that is now so general in the intercourse of Dentists.

Hypocrisy is a coin so generally current and acceptable, as to buy and sell all that is bad and too much of the little good that is found in our midst, so that we return to ourselves uninstructed and unimproved, being forced to guard against the petty pilfer-

ings of patients by neighboring practitioners; for a creed exists in the breast of some, that is hard to reconcile, either with honest conduct, or with the gentleman, in regard to obtaining patients. They not only think it proper to accept a patient, who by accident or design calls upon them, but feel *peculiarly induced* to *embellish* the advantages proposed to exist in themselves by all the arts of a French boudoir, the most modest simulation, praising the former dentist so as virtually to annihilate him in an apparent generous sympathy, the comedy terminating in a complete seduction of a patient, who, through ignorance or inappreciation, has only endeavored to satisfy themselves of the true qualifications or facts in the case.

Now we regard this as more than a weakness, because, it of necessity irreparably defames the character of an honorable man and a good dentist, or, it deprives him of his means of support, or of restoring a lost confidence, occurring perhaps, not from inability, but from misconception, accident, or carelessness of the patient.

Did a code of laws exist established by a local or state society, whose acknowledged authority would of necessity be recognized, a practitioner would be compelled to honorably explain the suspicious circumstances, sustain his fellow to the honor of the profession, and give the strongest proof of his own dignity and integrity, or stand anathematised by a body from whom the public demand the jurisdiction of such matters.

It is from such a power alone that our fraternity can be acknowledged by communities to possess those excellencies, which command the esteem of the good, the admiration of the wise, and the gratitude of the claimants for professional services.

Individual perfections are too feeble and inefficient to assist in elevating a calling, whose numerous members are drifting on the tide of popularity, by a self constituted compass, a self drafted chart, scrambling like schoolboys for the windfalls of an orchard, regardless of all but the unripe fruit, which too often proves worthless when captured.

Men constituting themselves not only suitable admirers of their own principles, but dictators and correct expounders of the character, principles and practice, of all who are so unfortunate as to

be attached to the same calling, demand a higher motive or influence, than an honorable emulation of a noble being, or a great man in the practice. The quiet satisfaction in depending on the future for the result of honest and truthful labor, does not offer a beauty to their eyes sufficiently dazzling, to bind them to the less obtrusive but more honorable course of doing that which will ultimate in the improvement of the whole body alike.

Irish Republicanism suits the views of such men as applied to dental practice, *Liberty of Speech* essential to their prosperity, *a Free License* to use anything their fancy dictates, with a conscience so elastic as to sanctify any action or course, provided always they pocket a few dollars thereby.

In looking around among those I have the honor to know, an individual looms out of the mass as particularly singular, being somewhat connected with the origin of this article. He has combined many occupations to enable him to draw a liberal balance sheet at the end of the year, not omitting a most conspicuous duty on each Lord's day. A fine eye to symmetry, induces him to barter a family steed occasionally to encourage useful changes, we presume! as well as to preserve his position on roads of much resort. Medical specialities claim his sympathy, as is clearly evident in each morning's paper, and to benefit poor human nature, some of her most insidious diseases enlists his especial attention in the leisure hours from dental practice. Church solemnities aid him much, as many victims from his clerical draught on the public find to their cost, that truly, "*all is not gold that glitters.*" But then how simple and innocent is the error? Tin, in many cases, has proven as useful as gold in others, so has amalgam, and so would beeswax, but conditions of disease and its causes are often inscrutable, therefore, it would be unreasonable to exact an infallible judgment from this man, in all cases as to which is the most fitting, besides the extreme reasonableness of his charges, provides for these misjudgments, if the inscrutableness of morbid laws does not, so that we are forced to pardon his frequent use of a tin base and golden surface, and also, that most pliable agent, amalgam. Nor can all the profession blame him for the want of judicious discrimination, or the want of density characterising his filling, for

he *does* acknowledge some leaders, and claims a full belief in the published opinions relative to soft plugs, amalgams, &c. Still I trust this may reach his eye, and reproach him for receiving fees for operations he must know to be failures, and that a dishonest action is thus impudently practiced by one styling himself a *dentist.*

What difference is there between a skillful larceny and a dental quack? but little, and that discreditable to the empiric. A pickpocket is generous in comparison, he delves down somewhere after something, and doubtless is quite satisfied if he gets it or not, he leaves undetected, to the shame of his own God created form only, the world drives along without attaching a merited reproach to a class of men, or an honorable body, but a quack robs his patrons to his certain discredit as well as attaching the shame and dishonesty to a calling fulfilled with the most honorable integrity by the better part of its members, and this, too, after claiming and winning their confidence.

We cannot too often repeat that the great source of our troubles, arises principally from a defective education, contracting the views of such persons, who thus enter the profession, either as a mere means of support, or as an easy pursuit speedily acquired, and readily fulfilled. Such individuals of necessity, must be ignorant of that etiquette most essential to professional men, and know not, that the strictest forms of gentlemanly conduct are indispensable, not only in all personal intercourse, but in the constant indirect contact with their fellows in their relations with patients, demanding the most scrupulous generosity and uprightness.

The medical profession felt this centuries ago, and nobly worked the necessary reformation, by establishing societies, with fixed laws and inviolate rules of practice, induced legislative action and chartered power, to enforce their observance, and now exists as at once the most learned and courteous profession of the world.

With the dentist, whose art from its enduring results, requires a more strict and manly adherence to such principles, his profession is bodiless and almost heartless, neither possessing societies or charters of service, he plunges into intricate duties, without any conventionalities, practicing without aim, except pecuniary

emolument, and without ambition other than a selfish individuality.

Too many practitioners in consequence fancy themselves the very embodiment of the art, and disdain confederacy through a false computation of profit and loss resulting. These nestors are satisfied with riches the great human want has thrust upon them, scarcely holding it possible for any higher position to be obtained, by combining the great truths and isolated small principles of the multitude, into codes and rules of practice, which all embracing would establish a noble science of fixed laws and inviolable deductions.

Medical men are seldom found traitors to their obligations, their societies would denounce them, and communities would coöperate to the just depreciation of all practice. True, they have infinitely less opportunities to defame one another; their prescriptions, if wisely applicable, cures the patient, if false, kills, and are buried; but dental operations, both good and bad, in all cases live after their application, and are always liable to be abused, ridiculed, and even *made* defective by subsequent examiners.

[TO BE CONTINUED.]

CONSULTATION FEES.

In the last number of the Recorder, we expressed our intention to make known our views relative to the justice and expediency of making a charge for advice, or, as it is generally called, a "consultation fee."

Our opinion is, that the members of the Dental Profession in this country, are doing themselves more than injustice by keeping up the present custom so laconically expressed in newspaper advertisements by the words "advice gratis." Most dentists would scorn the idea of any such *public* announcement. They would be ashamed to *preach* the doctrine, but have no hesitation in *practicing* it to the fullest extent. This may seem severe, but

is it not in effect true? Is it not precisely the position we all occupy?

We have said that our present course was doing us "more than injustice." We consider its effect somewhat debasing. The words "advice gratis" naturally suggest the idea of "other things in proportion," and if our opinions and advice be worth nothing, (which is the price that *we*, the *best* judges of their value, place upon them,) what estimate must we be held in by the public, for whom we perform important, painful and expensive operations, based upon such opinions and performed in consequence of such advice? Any one can see at a glance the inconsistency of such a procedure. It is in effect absolutely debasing, and we sincerely hope the profession as a mass will take the subject into consideration.

No one thinks of obtaining the opinion of his legal adviser without paying handsomely for it. No one consults a physician without remunerating him, and for what? Why, simply for an expression of their opinion or judgment, rendered valuable in accordance with its adaptation to the exigencies of the case, the amount of thought or study bestowed upon it; and as the time of some men, in consequence of the demands made upon it, may be more valuable than that of others, so must it also be taken into consideration.

If everybody could at once form correct medical or legal opinions, nobody would want them, for all would be supplied. But to form such opinions a peculiar education is required, a great amount of time, labor and capital is to be expended. The ability thus to advise and counsel is therefore dearly purchased and should not be lightly considered; nor is it, except by the dental profession. According to our college laws, a greater investment of money and time is required, previous to graduation, than in either of the other professions. The studies *may?* be less intricate, but the preparatory course is far more laborious. What reason is there, we ask, why we should not receive some compensation for parting with that which costs us so much, and which is so valuable and useful to others? We have omitted to note one very important fact; compared with the other professions our time is more limited, and should be proportionably valued. A certain

amount of *daylight* is essential to the proper performance of our professional duties. This necessarily greatly contracts our field of labor, and compels us to an economy of time, that makes every minute valuable. Look at this subject in any light, and there will be found in our present custom neither reason, right nor justice. We have conversed with quite a number of our professional brethren upon it, and all come to the same conclusion, viz. that justice and reason are in favor of compensating those who furnish reliable valuable advice. Some of them, however, seem to think it *inexpedient*, and this view of the question we wish somebody else to discuss.

POISONING BY CREASOTE.

BY MR. JEFFREY.

On the 29th August, 1853, I was called up in the night to see Mrs. B. her husband informing me that "she was in a very strange way, and that he thought she was dying." I found a young woman, aged about 24, in bed. She was insensible; her countenance very pale; frothing at the mouth; pupils quite dilated; pulse regular, rather full, about 80; the circulation seemed undisturbed. Every few minutes there was violent urging, nothing but saliva resulting. The stomach had been emptied by vomiting before I came. She had apparently severe paroxysms of pain on the right side of the face, to which she violently applied her hand; then again became prostrate. Her breath smelt strongly of creasote. A molar tooth on the right side of the lower jaw had a large cavity in it. I endeavored to rouse her by washing the face and temples with cold vinegar and water; and as the paroxysms of pain seemed referable to the diseased tooth, I fetched an instrument and removed it. She seemed scarcely to feel the operation; but the pain after a short time, appeared to have left her. In the course of an hour she improved, and became partially sensible.

I administered nothing but a mixture of sesquicarbonate of soda and water. The next morning I found her better, but pale and

weak ; the pupils of the eyes were still much dilated, and vision imperfect, which continued for several days. The patient's own account of the matter and of her sensations, which I took down on her recovery, perhaps will not be uninteresting

"Whilst in the act of putting a piece of lint saturated with creasote into my tooth it slipped and I accidentally swallowed it.—In a few minutes (much less than a quarter of an hour) I felt myself going very low. My eye-sight went from me ; giddiness came on ; and everything looked of a dark blue, even the candles, my husband, and everything. I felt a dreadful burning at my chest. I wanted water to quench the burning at my lungs. I vomited and brought up the piece of lint with some food. I had great pain at the front of my head, and felt numbed all over. The pain at my chest continued, and my eye-sight was imperfect for three or four days. I did not see plain until Friday (September 2nd). *I did not know my tooth had been taken out.*"

Nelson's American Lancet.

EDITORIAL.

CORRESPONDENTS, SUBSCRIBERS, EXCHANGES, &c., are requested to direct all Communications relative to the financial or business departments of this Journal, to "SUTTON & RAYNOR, 609 Broadway, N. Y.;" and articles for publication, books for review, exchanges, reports of society meetings, and all correspondence, belonging to the editorial department, to "EDITOR OF DENTAL RECORDER, 139 Fourth-Avenue, N. Y."

DENTAL CONVENTION.—For the benefit of those of our subscribers who are making arrangements to attend the "Dentists' Convention," to be held in this city, next August, we publish below the circular letter, issued by the Secretary of the Association, in connection with which we also reprint the Articles of Association. The idea seems to have gone abroad that the Convention is open, at once, to all members of our Profession who may desire to take part in its proceedings, such, however, is not the case. Those who desire to become members must be nominated and if they receive a majority of the votes they are then elected. With regard to the order of business,

Article 15, provides for the opening and organization of the session, this is to be followed by the election of officers, and such other matters as the business committee may have arranged.

PHILADELPHIA, May 15, 1856.

Dear Sir :

Through the medium of the Dental Journals, you have, no doubt, become aware that the "American Dental Convention," assembled, organized, and held its first session in the city of Philadelphia, August 2d, 1855.

In forming this Association its members were animated by the desire to establish a society upon a basis broad enough to obtain the united support of the entire profession ; and that its platform should be such as to secure to each and every dental practitioner—not only in the United States, but the entire world—an opportunity for a liberal expression of views upon the various topics connected with the principles and practice of the profession.

By referring to the report of the proceedings, you will find that throughout the entire session the most perfect unanimity of feeling prevailed, and that the various subjects broached elicited a free and spontaneous expression of opinion from those present.

The second meeting of the "Convention" will be held in the city of New-York, on Wednesday, August 6, 1856. At this, by the desire of the Association, you are respectfully and earnestly invited to be present.

Trusting that you will give the movement your cordial support,

I remain yours respectfully,

J. H. McQUILLEN, *Corresponding Secretary.*

AMERICAN DENTAL CONVENTION; ARTICLES OF ASSOCIATION.

ART. I. The Association shall be called the American Dental Convention.

ART. II. The Association is intended to promote professional and personal intercourse among those who are engaged in the cultivation and practice of dentistry throughout the world; to advance the cause of dental education, and systematize and strengthen the exertions of its friends, and, by a mutual interchange of opinions and experience, to advance the knowledge and liberalize the relations of the members.

ART. III. The convention shall consist of the members of the convention who shall sign these articles of association, and of such other practitioners of dentistry and auxiliary branches of science as shall hereafter be elected to membership, and in like manner sign these articles.

ART. IV. Candidates for membership shall be nominated by a member of this convention, at any of its meetings, and every such candidate as shall receive a majority of the votes cast upon the question of his admission, shall be declared duly elected.

ART. V. The stated meetings of this convention shall be held once every year, on such day and at such place as the convention shall, at each session, appoint for the next meeting.

ART. VI. The Officers of this convention shall be a President, Vice President, Recording Secretary and Corresponding Secretary, all of whom shall be elected to serve for the ensuing year, on the first day of the annual session, or on such other day of the session as may be appointed by the convention. And the officers incum-

bent shall hold their offices and exercise the functions thereof until their several successors shall be elected and installed.

ART. VII. The Vice President shall, in the absence of the President, or in the event of his death or resignation, perform all the duties of the President, and in the absence, or death, or resignation of both President and Vice President, the Corresponding Secretary shall serve as President, *pro tempore.*

ART. VIII. All elections shall be determined by a majority of the votes cast by the members present, and the manner of voting shall be either *viva voce* or by ballot, as the convention shall at the time determine.

ART. IX. A committee to prepare business for the session shall be appointed by the President elected for the year then expiring, which committee shall consist of one member from each State represented.

ART. X. The Business Committee, provided for in Art. IX., shall be the standing committee of reference for all essays and papers proposed to be read by members before the convention, and shall report their number, subject and length to the President, with their advice as to the order most expedient to be observed in presenting them to the convention, and the President shall thereupon appoint, at his discretion, the time at which they shall be read: *Provided,* that it shall always be competent to the convention to assign, by resolution, any other time for the reading of such papers, or to postpone such reading indefinitely. And the convention may also, by resolution, order the reading of any paper or communication at such time as it shall deem expedient.

ART. XI. All papers read before the convention by the members shall be the property, and at the disposal of their authors, unless otherwise disposed of by resolution of the convention with the consent of the authors.

ART. XII. The President may appoint any member or members of the convention to read a paper or papers upon any professional subject, at any subsequent session.

ART. XIII. The convention shall order and determine all matters not herein provided for, by resolution.

ART. XIV. The funds of the convention shall be held and appropriated by the Recording Secretary to the discharge of its expenses, and he shall report his accounts to the convention on the last day of the session, and shall assess it *pro rata* tax upon the members present to defray the same.

ART. XV. The President shall, on the first day of the session held at the close of his term of office, organize the session, direct the reading of the minutes of the last session, and deliver an address before the convention upon such subjects as he may deem most useful and important for their consideration.

ART. XVI. These articles may be altered and amended in whole or in part at any session of the convention, by a majority of the votes of the members present.

After the adoption of the articles of association, on motion of Dr. E. Parry, the convention resolved itself into the "American Dental Convention," and the former officers were re-elected viva voce, and Dr. J. H. McQuillen, of Philadelphia, elected Corresponding Secretary, by ballot, and Dr. J. S. Clark, of Louisiana, Vice President.

St. Louis, June 10, 1856.

Mr. Ballard,

Dear Sir: Enclosed I send to you an Abstract of the Proceedings of the "Western Dental Society," for publication.

Yours, in haste, H. I. B. McKellops.

Western Dental Society.—For the purpose of elevating and perfecting the noble profession of Dentistry, by the cultivation of an enlarged liberality of sentiment; by the fostering of an honorable spirit of emulation, and by the full and free interchange of views and opinions; the Professors of Dentistry, of the surrounding country and neighboring States, met in the city of Saint Louis, on the third of April, 1856, in the large Hall of the Saint Louis Medical College, and organized the Western Dental Society. The following were the officers elect for the ensuing year:

Dr. Edward Hale, Sr., of St. Louis, *President;*

Dr. H. E. Peebles, of Lexington, Mo., 1*st Vice President;*

Dr. W. W. Alport, of Chicago, Ill., 2*d Vice President;*

Dr. Henry Barrow, of St. Louis, *Recording Secretary;*

Dr. C. W. Spalding, of St. Louis, *Corresponding Secretary;*

Dr. A. Blake, of St. Louis, *Treasurer;*

Drs. M. W. Hicks, of Keokuck, Io., H. M. Lewis, of Quincy, Ill., H. I. B. McKellops, of St. Louis, S. Dunham, of St. Louis, and Isaiah Forbes, of St. Louis, *Executive Committee.*

A committee, appointed for the purpose, reported a Constitution, which was adopted.

The executive committee were instructed to procure a Certificate and Seal, and issue one to each of the members of the Association as a testimonial.

The subject of arsenic, fang filling, and anæsthesia, were ably discussed during the session.

On motion, it was Resolved, that any member who may have performed operations of a peculiar nature, present the same to the Society.

The following was unanimously adopted:

Resolved, That the thanks of this Society be tendered to the Faculty of the Medical College of St. Louis, for the use of their Hall.

Resolved, That when this Society adjourn, they adjourn to meet in Chicago, on Wednesday, the 30th of July. Adopted.

Dr. Alport, of Chicago, rose and asked permission to make a few remarks in behalf of his non-resident brethren.

Mr. President, in consequence of the generous treatment we have received from our Professional Brethren of St. Louis, by participating in social intercourse with our City Brethren, and the heads of the St. Louis Medical College, in the enjoyment of a glorious banquet, where there was a feast of reason and flow of soul; we met together, when the following was unanimously adopted, and we ask permission to have it spread upon the minutes:

Resolved, That we, the non-resident Dentists, express our gratitude and thanks to the Dentists of St. Louis, for the hospitable manner and brotherly affection with which they have received and entertained us while in their city.

Permission was granted, and the Society adjourned.

EDWARD HALE, Sen., *President.*

HENRY BARROW, *Recording Secretary.*

New-York Dental Recorder;

DEVOTED TO THE THEORY AND PRACTICE OF

Surgical, Medical and Mechanical Dentistry.

Vol. X.] AUGUST, 1856. [No. 8.

NECROSIS OF INFERIOR MAXILLA FROM THE VAPOR OF PHOSPHORUS.—Removal of the entire lower jaw.—Recovery.—Remarks upon Phosphorus Disease.

By JAMES R. WOOD, M. D., Surgeon to Bellevue Hospital, New-York, &c.

Case.—Cornelia S., born in Germany, aged 16; admitted into Bellevue Hospital, December 17, 1855. She came to this country at the age of three months; eight and a-half years ago her father died of phthisis; four years ago her mother died of fever. She has enjoyed good health up to the time of her present trouble. Two and a-half years ago she commenced to work in a match factory on Second Avenue, in this city, where she remained six or seven months. She then left this factory and entered another on Norfolk-street, where ventilation was very imperfect. Her business was "packing," the "dipping" being done in another apartment. She continued at her occupation, working eight hours a-day, and feeling perfectly well, until about the 1st of May, 1855. At that time she was seized with toothache, and swelling on the right side of the lower jaw. To relieve it, her gums were lanced, and, finally, the tooth extracted. After this the pain ceased; but the swelling gradually increased, until a spontaneous opening formed on the under side of the jaw, with a discharge of pus, which has continued since. She remained in the factory until one week previous to her admission into the hospital.

Upon examination after her admission, the inferior maxilla was found necrosed on the right side, and partially on the left.

Her general health was good. The jaw was painful, and that side of the face swollen. The discharge was at times profuse, and a part of it took place through the buccal cavity, rendering it very annoying. Her appetite was good, but mastication difficult and painful. She never had had syphilis. The necrosis gradually extended, but her general condition remained good.

On the 19th of January, 1856, thirty-three days after her admission, I proceeded to remove a portion of the necrosed bone upon the right side, intending to leave both the symphysis to which the lingual muscles are attached, and the ramus of the jaw. No anæsthetic was used. The patient was placed on the operating table, with her head and shoulders elevated, and her face turned towards the left side. The external incision commenced midway between the angle and the condyle of the right side, and extended along and under the base of the jaw, terminating one quarter of an inch below the symphysis menti. The soft parts were next devided, and the periosteum carefully separated from the bone. A chain saw was then passed under the jaw into the mouth, half an inch to the right of the symphysis, and the bone sawn through. The saw was again passed under the jaw, at its angle, for the purpose of dividing the bone at this point, but, unfortunately, on attempting to work it, the chain broke. I now seized the bone at this point with Liston's forceps, and endeavored to divide it, when it was readily discovered, in this attempt, that the jaw was necrosed to its articulation. I then endeavored, with the forceps, to remove the jaw entire upon the right side, and succeeded, with considerable effort, in completely enucleating it from its periosteal covering.

But little hæmorrhage occurred, and no vessel required the ligature. The parts where brought in apposition with sutures, and adhesive strips and cold water dressings applied.

January 20.—Pulse, 90; no pain; slept well last night.

January 22.—Wound dressed for the first time; a small part had united by first intention, the remainder in good condition; no pain.

January 26.—Wound entirely healed. An old fistula on the right side, still continues to discharge purulent matter.

While the right side had so greatly improved and apparently

left no remnant of the former trouble, the disease was extending upon the left side, involving new portions of the jaw, and giving rise to an immense secretion of intolerably offensive pus. It was, therefore, deemed advisable to attempt the removal of the remaining diseased mass. Accordingly, on the 16th of February, twenty-eight days after the first operation, I removed the remainder of the jaw. The whole of the opposite side I thought dead or dying. At the symphysis it had almost separated itself from the soft tissues, leaving only slight attachments for the lingual muscles. In removing this side of the jaw I designed to leave that part of the symphysis to which these muscles are attached, partly to avoid the liability of the patient's tongue receding into the larynx, but principally to leave an isthmus which should preserve the contour of the chin and serve as a point of departure for new bone, which would form the periosteum, thus far carefully preserved.

The external incision was similar to that of the opposite side, except that it terminated one-half an inch below and to the left of the symphysis, leaving half an inch of healthy tissue between it and the other cicatrix. The soft parts were next divided, and, with the periosteum was dissected from the bone, both on its external and internal surfaces, as in the previous operation. An assistant now took hold of the symphysis, and a chain saw was passed under the jaw into the mouth, from half to three-fourths of an inch to the left of the symphysis. My object in sawing through the bone to the lelt of the mesial line, was to prevent the accident previously mentioned; but, unexpectedly, the moment the bone was divided, the central portion left at the chin escaped from its attachments, by simple enucleation, into the hand of the assistant and the tongue was immediately swallowed. Respiration instantly ceased, and suffocation impended; but, with a pair of strong forceps, the tongue was seized and replaced, and a ligature passed through it, and secured externally. It was now ascertained that that portion of the bone above the angle was not necrosed, as on the opposite side; but it was decided that the disease could not be arrested, without its entire removal. To complete the operation, the soft parts were separated from the ramus in conjunction with the periosteum, the capsular ligament was opened an-

teriorly, and a chisel passed over and behind the condyloid process, and by this means the bone was disarticulated. Not a single vessel was tied. The wound was dressed with sutures and adhesive strips. Twenty drops of laudanum were ordered, to procure sleep.

February 17.—Pulse 112; slept well; wound glued together throughout its whole extent; considerable swelling, but no redness or increase in temperature. Left eyelid œdematus and closed. Wound re-dressed with adhesive strips, and lotio plumbi et opii applied.

February 18.—Face much swollen; some pain over region of the jaw; pulse, 138, and irritable; wound united more firmly, except about half an inch near an old fistulous opening, which discharges pus and saliva. Four ounces of wine ordered to be given during the day—and the lead and opium wash continued.

February 19.—Pulse, 100; pain and swelling greatly diminished. Left eye partially open—continue treatment.

February 20.—Pulse, 98; no pain; some œdema of palpebræ. Eye easily opened; wound united by firm adhesions throughout its whole extent; no fistulous openings on left side of the face. Appetite good; diet consists of soups and farinaceous substances; unable to masticate solid food—continue the lead and opium wash.

February 21.—Swelling of the face nearly subsided; eye open; ligature in tongue removed.

February 23.—Swelling entirely subsided. The contour of the face is perfect. All the movements of the tongue, and those pertaining to the jaw, are preserved—such as protrusion of the tongue, lateral motion, deglutition, etc.

From this time until the 4th of March, the patient did well, and every thing seemed to favor a permanent and radical cure. On the 4th she went out on a visit to her friends. She was thinly clad, and suffered from the cold. The next day, March 5, the left side of her face was swollen, hot, and painful. She had some thirst, a light fur on the tongue, and an accelerated pulse—ordered a cathartic, with lead and opium wash.

March 6.—Patient feels much better; all inflammatory symptoms have subsided. Two fistulæ have formed in the track of the cicatrix, which are discharging healthy pus—ordered a light flaxseed poultice.

March 12.—Two small pieces of bone discharged through the fistulous openings.

March 20.—Fistulæ entirely closed.

During the progress of the case no unfavorable symptoms appeared. The incisions healed with remarkable rapidity. The patient had a good appetite during the whole time. The contour of the face is preserved with remarkable accuracy. The cicatrices are entirely concealed from a front view, and all the motions pertaining to the jaw and tongue are unimpaired. New bone began early to form, and small pieces have already separated.

[TO BE CONTINUED.]

ON CERTAIN CONDITIONS OF THE DENTAL TISSUES.

By JOHN TOMES, F.R.S., Surgeon-Dentist to the Middlesex Hospital.

The temporary teeth, when about to be replaced by the permanent set, lose their fangs by gradual absorption of their substance. The crown, when thus left, having but little hold upon the gum, soon falls out. The manner in which the absorption of the dental tissues is effected has been described in a paper published in the "Philosophical Transactions," in 1853. The subject is there mentioned in connection with the absorption of the bone.

Having latterly had occasion to devote considerable attention to the phenomena attending the casting off of the deciduous teeth, several conditions relative to absorption have come under my notice, which, as applied to teeth, had, I think, hitherto escaped observation. It may, however, be here stated, that the more recent examinations have not led to any modification of the opinions upon the subject of absorption advanced in the paper alluded to, but have served rather to confirm the statement there made. Absorption may commence upon any part of the fangs of a tooth, and at several points at the same time. By

the gradual extension of this process, both in depth and superficially, the root of the tooth is wasted, till, at last, nothing is left but the crown, and even this part is often so much hollowed out, that, excepting the enamel, but little of the tooth remains. The *cementum* is first attacked, then the *dentine* disappears, and the enamel at those points where the *dentine* has been entirely removed suffers from the same action. But whichever of the three tissues is attacked, we see the same characteristic surface as that shown by bone when undergoing a similar action, namely, a surface full of deep indentations, as though they had been made by a sharp piercing instrument, having a semicircular extremity. These minute holes or depressions proceed in various directions, several advancing from contrary points towards the same spot, not unfrequently isolate pieces of *dentine.* If a section be taken through the substance of a tooth, so as to cut the wasting part at a right angle, we shall find the surface acted upon to have an irregular festooned outline, so characteristic, that when once seen it cannot fail to be again recognised.

It has been stated that, closely applied to the surface, a cellular mass will be found, and that this is but slightly adherent, the wasting and growing surfaces readily parting, unless the two are held together by the irregularities on the surface of the former. It will sometimes happen that the cellular mass penetrates into the *dentine* through a small opening, and there dilates, in which case its withdrawal becomes impossible. This condition is now and then found on sections prepared for the microscope, when we have an opportunity of examining the two tissues *in situ.* Indeed we shall find a few cells adherent to the surface of the *dentine* where less deep burrowing has occurred. The cells themselves do not present any peculiarity by which they could be readily recognised, if separated from the part undergoing removal. They are small granular cells, of a more or less spherical form. If a tooth which has lost its fang be carefully removed, we shall find remaining in its place a growing *papilla*, corresponding exactly in size and form to the surface from which it has been separated; and this separation may often be effected with so little injury to the absorbent organ, that no blood appears upon its surface after the operation, although the organ is highly vas-

cular and readily torn.* The superficial extent of the papilla will be equal to that part of the tooth undergoing waste, but the extent, as regards depth, is slight, for, as the root of the tooth disappears, the socket is contracted by the deposition of bone, which forms at the base of the absorbent organ, as rapidly as the cellular surface encroaches upon the tooth. The cases in which we find an exception to this condition are those in which the permanent has advanced close to the fangs of the temporary tooth, when the crypt containing the one communicates with the socket of the other, the rate of growth of the permanent having been greater than the absorption of the deciduous organ; but even in these cases we may generally observe some part in which the contraction of the socket is coincident with the absorption of the occupant fang. From the following quotation, it does not appear that Mr. Bell observed these conditions:—

"It has been already stated, that the permanent teeth during their formation are crowded together in the jaw, by being placed in a smaller arch than they would occupy if regularly placed side by side. As the latter, however, is their destined situation, we find that as soon as they are advanced to a certain point of their formation, and can no longer be contained within the *alveoli*, absorption takes place in the anterior parietes of the cavities, by which means the teeth are allowed to come in some measure forward. In consequence of this absorption it often happens, that not only the socket of the corresponding temporary tooth, but that of the tooth on each side is also opened to the permanent one. Absorption now commences in the root of the temporary tooth, generally on that part nearest its successor, and thus goes on by degrees as the latter advances, until the root is completely removed, the crown at length falls off, leaving room for the permanent tooth to supply its place."

Mr. Bell, however, rejects the idea that mere pressure of the one tooth against the other has anything to do with the absorption of the first set; an opinion that he would probably have expressed even more strongly, had he observed the shallow but perfect sockets which are formed when the temporary teeth are shed before their successors are ready to appear. This, however, must be a very common condition, as I have in my own collection several specimens illustrating the point.

The fact was not overlooked, I think, by Hunter, although his description is not very clear. He states at page 99 in his 'Natural

* Laforgue and Bourdet recognised the presence of the absorbent organ, but supposed it exhaled a fluid capable of dissolving the roots of the temporary tooth.

History of the Teeth:' "The new *alveoli* rise with the new teeth, and the old *alveoli* decay in proportion as the old teeth decay; and when the first set falls out, the succeeding teeth are so far from having destroyed by their pressure the parts against which they might be supposed to push, that they are still enclosed and covered by a complete bony socket. From this we see that the change is not produced by a mechanical pressure, but by a particular process in the animal economy."

But there is still a disposition on the part of many who are intrusted with the treatment of teeth, to attribute the absorption of the roots of the one tooth to pressure occasioned by the growth of its successor, and the development of the permanent may have something to do with the shedding of the other. But this does not offer a satisfactory explanation of all the circumstances attending the absorption of the fangs of teeth. In the first place we sometimes meet with cases in which the fangs of permanent teeth are as completely absorbed as those of the temporary organs. Then, again, the fangs of temporary teeth, which have no successors, are also absorbed. These circumstances, taken with the hitherto overlooked fact, that with the waste of the temporary tooth we have pretty generally a corresponding development of bone within the socket to be removed before the permanent tooth appears through the gum, render the pressure theory somewhat unsatisfactory. Another condition may be adduced, tending also against that opinion, namely, that temporary teeth occasionally maintain their place to the exclusion of the permanent ones, which are then kept within the substance of the jaw, or appear in some unusual position.

The relation as regards time between the absorption and shedding of temporary teeth and the appearance of the succeeding permanent teeth, are by no means constant. In some cases the temporary teeth are thrown off two years before the corresponding permanent ones come through the gums. In others, again, the new will replace the old ones in as many weeks or even days.

Before the laws which regulate the absorption of the fangs of teeth can be fully recognised, a more perfect knowledge of the condition attending the process must be acquired. Recent examinations have enabled me to add the following additional facts

bearing upon this subject to those already known. The process of absorption once commenced, it appears to have been assumed that the same action would be continued, with more or less rapidity, until the tooth falls out; or if not continual, is suspended only. Such, however, is not constantly the case. Not only is the action of absorption suspended, but one of development takes its place. We find the excavated surface of the *dentine cementum* and enamel covered with *cementum*, the latter following all the irregularities of the former tissues, and closely united to them. In cases where this development is going on, or being set up is maintained, the teeth afford considerable resistance when their removal is attempted. In those instances where the first teeth have remained, and tend to the displacement of the second set, this deposit of *cementum* will be found to exist in considerable quantity.

The development of bone upon the surface which had formerly been the seat of absorption, by no means indicates that the tooth will not again be subject to destructive action. On the contrary, specimens in my collection show that the bone deposited under the above circumstances may itself become the subject of absorption, that this process may be again suspended and development be renewed, that the absorption may again take the place of development; in fact, that wasting and reparation may alternate until by the preponderance of the former the tooth is shed. In sections of teeth showing this peculiar condition of development, we may find upon the growing bone numerous osteal cells, with here and there a lacunal cell. A bone *lacuna*, situated within a semicircular indentation in the *dentine*, gives the appearance of a lacunal cell, and a *lacuna* similarly situated in the *cementum* (a circumstance of common occurrence), has possibly been supposed by Mr. J. Salter to be what has been described in the paper before referred to as a lacunal cell.*

The part of a tooth which as the greatest power of resisting absorption, is that in immediate contact with the pulp. We find examples in which a thin shell of *dentine* surrounds the organ, while that around it has been in great part taken away. This is, however, eventually removed, and the pulp itself changes its

* Transactions of the Pathological Society, vol. vi., p. 169.

character, and becomes an absorbent organ, or makes way for that which is. In a fortunate selection we may find sections showing in one part *dentine* which has been but recently formed, with its modular outline and contiguous cells, capable of developing *dentine;* in another part absorption in active progress; and in a third the deposition of bone on the surface of the wasted *dentine.* In no instance, however, have I seen *dentine* deposited upon the surface of that which has been diminished by absorption.

It would appear that the dentinal pulp, although its function may be changed into that of absorption, or its place be taken by an absorbent organ, and this, again, changed to one for the development of bone, is incapable of resuming under any recognised circumstances its primary function of dentinal development. In other words, that a portion of *dentine* when removed by absorption, cannot be replaced;† while in bone, or *cementum*, the removal of a lost portion is of frequent occurrence. Sections taken from the teeth of adults seldom fail to exhibit points where the *cementum* has been removed and again added; and very commonly the absorption has at points extended a short distance into the *dentine*, and the lost parts made good with *cementum.* This condition may be observed in perfectly sound teeth; but in unsound ones, where the *cementum* exceeds the normal amount, the removal and renewal of tissue is still more marked. If the section be so made as to give a view of the surface of the pulp cavity, we shall probably find evidence of the pulp after the full development of the tooth, having resumed its full formative powers, and produced new, or secondary *dentine*, the action having been excited either by the wearing away of the tooth or by the presence of caries. If the irritation be continued until it extends down the fang as far as its extremity, and signs of inflammation show themselves, the aperture of the fang will become enlarged by

† Since the manuscript was sent to the Editors of this Journal, I have seen a paper published in the last number of the Guy's Hospital Reports, by Mr. J. Salter, 'On Intrinsic Calcification of the Permanent Tooth-pulp.' Mr. Salter describes a section taken from a carious temporary molar, which was removed from the mouth of a person aged 18 years. The author states, that the "pulp was found converted into a mass of crusta petrosa and dentine confounded together." The drawing is beautifully executed, and shows, by the usual indications, that the pulp-cavity has been enlarged by absorption of its parietes. Judging from a view of the engraving only, it would appear that the tissue in contact with the wasted dentine is cementum only, while the newly-developed dentine is limited to the inner portion of the mass. If this view be correct, the specimen would have served for the illustration of the present paper.

absorption, and after awhile the enlargement is continued to a considerable distance up the root of the tooth. The canal may be again contracted by the formation of *dentine*, or by the development of *cementum;* and I have seen one or two instances in which the greater part of the pulp cavity in permanent teeth has been lined with *cementum*. This condition of tissues is very common in teeth that have been long the subject to caries, but I believe it is not confined to carious teeth. I have several specimens of temporary teeth, in which the lower part of the root has suffered from absorption, and then has become the seat of deposition of *cementum*, leaving only a small canal in the centre.—High up the root small patches of *dentine* have been removed, some of which only have been made good with *cementum*, while the contiguous parts have retained their usual condition.

It will be seen that the foregoing facts bear upon the opinions advanced by Mr. De. Morgan and myself, in the paper on the structure and development of bone, before cited; that we have indications in teeth, as in bone, of alternations, of removal, and deposition of tissue. In the young subject, the development of bone tissue is in excess of absorption, allowing the bones to increase in size; that in middle life the two powers, under ordinary circumstances, balance each other, and the bones preserve their adult dimensions; while in old age the absorbent action appears to preponderate. Conditions pretty nearly parallel occur in the dental tissues after the temporary tooth has been fully formed; portions of *cementum* are removed, and with it, in some cases, a little *dentine*; the lost parts are replaced by *cementum*, and the tooth is again perfect. When the time approaches for shedding the teeth, the two actions alternate; but the absorption being in excess of the development, the tissues disappear, and the tooth is shed. After the formation of the permanant teeth we have occasional alternatives of the two actions; but they are balanced, and neither increase or diminution of size is observed. But as age comes on, it often happens that absorption is in excess, the fangs diminished in size, the teeth become loose, and fall out.

[TO BE CONTINUED]

EDITORIAL.

CORRESPONDENTS, SUBSCRIBERS, EXCHANGES, &c., are requested to direct all Communications relative to the financial or business departments of this Journal, to "SUTTON & RAYNOR, 609 Broadway, N. Y.;" and articles for publication, books for review, exchanges, reports of society meetings, and all correspondence, belonging to the editorial department, to "EDITOR OF DENTAL RECORDER, 139 Fourth-Avenue, N. Y."

THE SECOND AMERICAN DENTAL CONVENTION, was held, in this city, last week, commencing on Wednesday, August the 6th, and adjourning on Friday. The proceedings, throughout, were characterised by good feeling, and were governed by an evidently earnest desire for the welfare of the Profession. Members from abroad *seemed* to enjoy themselves, and members at home certainly did enjoy the unprecedented gathering to their heart's content. During the session nothing occurred to mar the enjoyment of any. We give below a condensed summary of the proceedings, necessarily more or less imperfect, intending in a future number to give a circumstantial account.

AMERICAN DENTAL CONVENTION.

The Association of Dentists, organized one year ago, at Philadelphia, under the title of the American Dental Convention, commenced holding its second annual meeting, yesterday, at Hope Chapel, in this city. A large number of members—apparently about 100—were present from nearly all the States of the Union.

Dr. JOHN B. RICH, of New-York, President of the Convention, called the meeting to order.

Dr. CHARLES BONSALL, of Cincinnati, the Secretary, read the minutes of the last meeting at Philadelphia, by which it appeared that 82 gentlemen of the profession were there enrolled as members last year.

Dr. DANIEL NEAL, of Philadelphia, offered the following resolution :

Resolved, That all practicing members of the Dental profession, who may be present, and feel desirous of co-operating with us, be considered as, and hereby are, active members of this Convention, and are requested to sign the Articles of Association, at their convenience.

The Chair ruled the resolution out of order, and cited the 3rd and 4th Articles of the Constitution to sustain his decision, as follows :

ART. 3. The Convention shall consist of members of this Convention, who shall sign these Articles of Association, and of such other practioners of dentistry and auxiliary branches of science as shall hereafter be elected to membership, and in like manner sign these articles

ART. 4. Candidates for membership shall be nominated by a member of this Convention at any of its meetings, and every such candidate as shall receive a majority of votes cast upon the question of his admission shall be declared duly elected.

Dr. J. H. McQUILLAN, of Philadelphia, moved that the above articles be suspended, which was carried.

Dr. NEAL now renewed his resolution.

Dr. ELISHA TOWNSEND, of Philadelphia, moved to amend by substituting "at liberty" for "requested."

The amendment and resolution, as amended, were, after discussion, adopted.

Dr. J. M. CROWELL inquired if gentlemen engaged in auxiliary branches of the profession were now to be considered as taking part with the Convention.

The CHAIR ruled that they were not—none but practicing dentists.

DR. BALLARD, of New-York, moved that gentlemen engaged in auxiliary branches of the profession be admitted upon the same footing as dentists.

A lengthy discussion here arose involving the question as to what was meant by auxiliary branches, and as to the propriety of including any but practicing dentists. After various amendments offered and suggested, the resolution was shaped so as to admit gentlemen who have been practicing dentists, but are now engaged in auxiliary branches, or any persons that may be nominated and elected as members.

Dr. L. W. ROGERS, of Utica, moved that the resolution be laid on the table. Agreed to.

As the Chair had already ruled that none but practicing dentists were permitted to take part in the proceedings, various propositions and suggestions were made for the purpose of admitting certain persons present who were now excluded from participation, and the matter was finally settled by leaving such persons to be nominated and elected. Several gentlemen were accordingly elected members not now practicing dentists, and one or two were rejected as not engaged in auxiliary branches of science.

Dr. MCQUILLAN, of Philadelphia, Corresponding Secretary, being called upon for his Report, stated that 2,800 circulars had been printed and sent off to different parts of the Union.

Dr. BONSALL, Recording Secretary and Treasurer, reported for various items of expenditure, $87,95; by cash received, $72; balance due, $15,95.

Dr. CLARK, of New-Orleans, Chairman of the Business Committee, appointed by the Chair, made a partial report of the order of proceedings as follows: After an address by the President, 1st. Election of officers; 2d. The pathological condition of diseased dentine, and its treatment; 3rd. Best preparation of gold for filling.

The CHAIR remarked that there was no subject upon which he would deem it proper to address the Convention, considering it rather as presumption for him to attempt to do so. He took occasion, however, to state certain expenses which he had incurred in behalf of the Convention for use of room, and for a full report of the proceedings.

On motion, the report of the Chair was adopted.

The Convention then proceeded to the election of officers for the ensuing year, with the following result: President, Chapin A. Harris, of Baltimore; Vice President, Daniel Neal, of Philadelphia; Recording Secretary, Elisha Townsend, of Philadelphia; Corresponding Secretary, Walter W. Allport, of Chicago. After which, the Convention took a recess till 4 o'clock.

AFTERNOON SESSION.

After calling the Convention to order, Messrs. CLARK and TOWNSEND conducted the newly elected President to the chair. The retiring PRESIDENT returned thanks to the Convention for the kindness and support shown him in the discharge of his duties. Dr. TOWNSEND introduced the President elect with a few appropriate remarks, followed by an acknowledgment of thanks by the PRESIDENT for the honor conferred upon him.

The Convention then, after voting to limit each speaker to ten minutes, proceeded to discuss the subject of the PATHOLOGICAL CONDITION OF DISEASED DENTINE AND ITS TREATMENT.

Dr. JAMES TAYLOR, of Cincinnati, by particular request, opened the discussion. He remarked that every dentist had noticed that the conditions of the decay of teeth were not similar. Many did not stop to inquire the cause of this difference. In some patients the dentine was extremely sensitive, and in others not at all. He apprehended that in all healthy dentine there was a circulation kept up through it. Their extreme changes he regarded as a departure from health. There were three kinds of decay—the black, the brown, and the white.

In the black there was little sensibility, and little disintegration of the particles; in the brown there was disintegration, the limy portion of the structure being generally consumed, leaving the cartilagenous portion in a soft state; in the white decay there was an excess of sensitiveness, and more of the cartilagenous portion was removed than of the earthy part.—These different kinds of decay were evidently caused by different agencies and a different physical condition of the teeth, and required different treatment, otherwise further progress of the disease was liable to take place.

Dr. TOWNSEND, of Philadelphia, had noticed the same conditions of dentine as those of which Dr. Taylor had spoken, and felt that in merely removing the caries everything had not been done that ought to be done. The dental art was not scentific unless they endeavored to look further than this. When he commenced his profession, a gentleman said to him, "So, you have got to be a mouth-carpenter." It was necessary to know something of the pathological condition of this dentine, and all of them perhaps were deficient in this kind of knowledge. Very early in his practice he suggested to an anatomist of considerable skill whether there might not be a circulation in the dentine out entirely to the borders of the enamel, and whether there were not fibrous nerves passing through the whole body of the dentine which caused extreme tenderness in some cases from inflammation. His friend laughed at him, and said that there were no nerves there to become inflamed. But he had proved by deduction that this sensitiveness was in the branches of the nerves, which could not be discovered but by a powerful microscope. They were found to extend almost to the very surface of the enamel in some instances, proving his hypothesis correct.

Dr. W. H. DERVILLE, of N. Y., indorsed the theory of Dr. Townsend. The dentine was ramified by tubuli which lay at right angles with the nerve, as he had seen through a microscope. He had some specimens which he would be happy to show to any members at his office. The

tubuli were 1-6,000 or 1-7,000 of an inch in diameter, and were subdivided so as to form little canals or canaliculi. What fluid charged these tubuli was matter of hypothesis, it was probably more subtle than the ordinary gross fluids of the body. The most sensitive part of the nervous system was the surface; a scald or burn produced a hundred fold more pain than the severing of a nerve. So with the teeth, the surface was the most sensitive. Hence the propriety, as was once suggested to him, of separating the dental tubuli by intersection at the lowest point.—In regard to remedies for dental caries, he had found a solution of chloroform and chloride of zinc as the happiest. It was absorbed by the tubuli and benumbed the sensitiveness.

Dr. STACKPOLE, of New-Hampshire, was not satisfied that any fluid existed in the tubuli. Patients often came to his office to have a cavity examined when there was none there; the sensitiveness had deceived them.

Dr. TAFT, of Cincinnati, said that the pathological condition was modified by various circumstances. In some only a single point was sensitive, and that at the junction of the enamel with the dentine; in others at a given point within the cavity; in others again on the crown of the tooth. There were cases when it was impossible to reduce the sensibility without constitutional treatment. That treatment should of course be modified by the character of the sensibility.

Dr. McQUILLAN, of Philadelphia, had always questioned applying the term inflammation to that condition; he thought inflammation impossible. Was it posssble for tubuli 1-10,000th of an inch in diameter to become the seat of inflammation? The circulation, in the dentine he considered analagous to that of sap in vegetables, and if any blood was found there it possibly came from ruptured vessels close by, forcing the blood in.—Redness was not always a sign of inflammation, neither was pain.

The CHAIR here begged leave to withdraw for the remainder of the day, to meet his family, just out of the city, and called Dr. Neal to the chair.

Dr. SMITH, of Connecticut, had found that by separating the gums from the teeth he had relieved this sensibility so that he could excavate the tooth without producing much pain. He had not always found chloroform and chloride of zinc effectual.

Dr. STARWIN, of Connecticut, had tried this remedy, but not always with success. The most effectual cure was a very sharp excavator, excavating close to the enamel first. In some cases he had first to administer cathartics to get the system in a proper state before the patient could submit to the operation. In reply to a question, the gentleman said it took from three days to three months to bring this about.

Dr. HOWARD, of Maine, had applied pulverized Spanish flies in some cases with good effect.

Dr. DIXON, had found frequently that those who suffered most were the most healthy, constitutionally, which was the reverse of the experience of some, as stated here.

On motion, the Convention adjourned to meet at 10 A. M. to-morrow.

SECOND DAY—MORNING SESSION.

Dr. CLARKE, from the Committee on Business, reported in favor of continuing the discussion of the subject of diseased dentine till 12 o'clock, when Dr. Townsend would read a paper on "Professional fees."

Dr. TOWNSEND announced that at a meeting of the Society of Dental Surgeons held this morning at 9 o'clock, it was unanimously resolved to dissolve the Society.

A number desiring to hear the minutes of yesterday read, Dr. Bonsall stated that he had not been able to prepare the minutes, but at the suggestion of Dr. Rich the report of THE TRIBUNE was read (omitting the discussion of diseased dentine) as embodying substantially all the minutes required.

The Convention then resumed the subject of DISEASED DENTINE.

Dr. TAFT, of Ohio, suggested the reading of a paper on the subject by Dr. WATT, of Ohio, who accordingly read an elaborately prepared paper written for publication in The Dental Register. He stated that it was founded in part upon experiment, but he had made free to use the opinions of others upon the subject. The subject of the paper was "THE ACTION OF TROPICAL REMEDIES ON INFLAMED DENTINE."

Dr. ARTHUR, of Philadelphia, said it was an indisputable fact that the sensitiveness of the dentine was indicative of an unhealthy condition. It was well known that the sensitiveness of the cavity of the tooth was increased by the lapse of a short time after being excavated. Objection had been made to the use of the term inflammation as applied to dentine. He thought that term more clearly expressed the exact condition. Inflammation was caused by the action of agents producing irritation of the parts. It was not always accompanied by pain. Our knowledge of the internal structure of the teeth was very imperfect as yet, and perhaps it would never be possible to understand perfectly the nature of the vital changes going on in the teeth. Whenever the original cause of the irritation was removed, unless great injury was done to the part, nature would set to work to restore them. Dentine was like any other animal tissue in this respect; if protected from the action of agents that produced the sensibility of the parts, the disease would pass away. This was one method of treatment, filling the excavated cavity with a temporary substance until the healthy condition was restored. Where there was considerable thickness of the dentine between the cavity and the pulp, substances that will destroy the vitality of the part might be used with advantage, and arsenous acid he had found to be one of the best. But in order that absorption should go on, vitality was necessary, and it was well known that a dead substance did not absorb compounds. Arsenous acid, however, would in time pass through the dentine to the pulp by infiltration. The action of arsenous acid was slow. He had used this remedy fifteen years with great care and watchfulness, knowing that it had been objected to and often injudiciously used. Of course where it can be avoided, it should be.

Dr. WRIGHT, of Ohio, inquired if he used acetated combination?

Dr. ARTHUR said he used arsenous acid, and until a few years past he had always used it dry. His usual practice was to allow it to remain

ten or twelve hours only to avoid any possible danger. In some cases the sensibility was not destroyed, but rather increased, by one application, in which case a further application was necessary. He had used arsenic in form of cobalt, which was less dangerous; that might remain 24 hours.

Dr. ROGERS asked if he put in anything to neutralize the acid?

Dr. ARTHUR said he usually did, but in 24 hours he did not fear the penetration of it to any depth.

Dr. COLBURN, of Newark, had made use of mechanical pressure as the surest remedy in case of the brown decay. He applied his finger, covered by the napkin to the edge of the gum in contact with the decay and pressed with great force, after which he could excavate successfully in most cases. There were some cases, however, in which he could not get at it. He did not conceive the sensitiveness to be conveyed through the tubuli, but through the periosteum. The decay could generally be removed in a lump. If the sensitiveness was conveyed by the nervous system through the tubuli, why would not the bottom of the cavity be as sensitive as the top?

Mr. BALLARD thought the gentleman had a peculiar physiological theory.

Dr. ROGERS had used arsenic some twelve years ago to destroy pulp, and was induced to use it to destroy dentine where it was extremely sensitive. Previous to doing so he had no knowledge of its being used for that purpose. The operation was successful in destroying sensitiveness. He saw his first work done in this way some three years afterward, but was not quite satisfied with its appearance. In the first case the whole body of the tooth was discolored, but it was owing probably, to imperfect execution.

Dr. KENDRICK, of Natchez, inquired if he used in that case dry arsenic or in solution.

Dr. ROGERS—Dry.

Dr. RICH inquired of the gentleman from Newark, how he managed to get his finger-nail under the edges of the gum when the tooth was very small; it seemed to him a mechanical impossibility.

Dr. COLBURN—When it is a mechanical impossibility, I do not expect to do it. [Laughter.] He had generally, however, been able to accomplish it.

Dr. SEARLE, of Springfield, thought the secret of the effect produced of destroying sensibility was by producing another pain, which Dr. COLBURN admitted might be possible.

Dr. BALLARD had recently under his care four sisters whose teeth had been treated with arsenic, and they had twenty-seven teeth in all whose vitality had been entirely destroyed by its use. He had great faith in a sharp instrument. He had frequently used chloride of zinc and chloroform. He thought nature was one of the best remedies, and if the dentine was left to itself with suitable protection, it would entirely recover its tone; the cavity in that case should be very carefully prepared.

Dr. ARTHUR inquired if the dentist who had operated on the teeth of the four young ladies was a skillful one.

Dr. BALLARD said he had a high reputation as an operator,

Dr. FLAGG, of Philadelphia, thought the last speaker rather too sweeping in his remarks against the use of arsenic. It was liable to accident, it was true; that the number of hours allowed for it to remain in the cavity should not, in his opinion, exceed five. He cited a case in his practice in which, by disobeying his orders and leaving the arsenic in too long, the patient's teeth had been destroyed.

Dr. TAFT, of Ohio, spoke of the necessity of treating cases according to modifying circumstances of age, temperament, &c. As regarded the material for temporary filling, he considered Hill's stopping as more easily applied than gutta percha, and it would not contract by cooling. Nitrate of silver and chloride of zinc might be used for decomposing the lamanæ of the sensitive dentine, and arsenous acid if you wished to destroy the life of the entire tooth. The gentleman mentioned a case of the destruction of a tooth in his practice by using arsenic which remained in fourteen or fifteen hours.

Dr. CLARKE, of New-Orleans, desired light upon the prevention of the death of the teeth. It had been a matter of serious investigation with him, and he had no doubt he had sacrificed many teeth where they might have been saved—some by operating where he should not have done it, and some by postponing the operation.

Dr. TOWNSEND, of Philadelphia, read a paper on the above subject, which was listened to with great interest and frequently applauded.

On motion of Dr. ROGERS, the thanks of the Convention were tendered to the gentleman, and a Committee was appointed to recommend such action as might be deemed expedient upon the subject. The Committee consists of Drs. Arthur, Ballard and Clarke—Dr. Rogers having asked to be excused from serving.

A few moments were now occupied in collecting the assessment of $3 from each member for expenses.

On motion of Dr. BALLARD, the following resolution was adopted:

Resolved, That this Convention shall consist of all practicing dentists who may desire to take part in its proceedings; and that any clause in the constitution conflicting with this resolution be and hereby is repealed.

Dr. TAYLOR resumed the discussion of diseased dentine. He took the ground that whenever sensibility could be discovered around under the enamel, the nerve never was utterly exposed, and there was a likelihood of preserving the vitality of the tooth. The increased circulation in diseased dentine was necessary for a proper deposition of bony matter, which would ultimately protect the pulp. He thought a great deal of difficulty in practice arose from patients not observing a proper diet, in refraining from vinegar and other acids.

Dr. HARRIS, of Baltimore, (Dr. Neal in the chair,) said that caries was the result of chemical agents, which, doubtless, were generated in the mouth, or were eliminated from particles deposited between the teeth. Chemistry told us that there were only four acids capable of producing this effect upon the teeth; but it was known to all dentists that all vegetable and mineral acids acted upon the teeth. It was difficult to determine what this exalted sensibility of the teeth depended upon. In one instance suppuration had been noted as one of these conditions; but he was inclined to think it a mistake. There was sometimes a painful

impression conveyed by the medium of the filling, which he had always been able to remedy by interposing a non-conductor between the gold and the floor of the cavity, and permitting it to remain several months and then refilling.

The Convention here took a recess till four o'clock.

AFTERNOON SESSION.

On motion of Dr. TAFT, the Business Committee were requested to prepare the business for the next annual meeting before the meeting is held.

On motion of the same gentleman, the Convention resolved to close the discussion of the present subject at five o'clock.

Dr. CLARKE wished to know whether inflammation was a proper term for exalted sensibility of the dentine.

Dr. HARRIS, (the President) said that the true definition of inflammation had not been satisfactorily settled by pathologists.

The subject was further discussed by Drs. Munson, McQuillan, Watt, Clark, of New-York; Taylor, Miller, Roberts, of Philadelphia; and Dwinelle; after which the Convention took up the subject of the BEST PREPARATION OF GOLD FOR FILLING.

Dr. RICH, of New-York, asked leave to make a correction in the report of his remarks last year in *The News-Letter* on the subject of the preparation of cylinders.

Dr. DWINELLE, of New-York, took strong ground in favor of crystalline gold for filling, and stated that this material had been adopted by as many as twenty dentists of his acquaintance. It was perfectly pure, and Dr. Watts had lately succeeded in producing a perfect article. He had filled cavities with it, and afterward taken out the gold and proved its specific gravity equal to melted gold.

Dr. TOWNSEND, of Philadelphia, had tried to use it, but without success. He was deeply interested in the result, and expended his best efforts to obtain success, but had failed. Being told that he had not procured a perfect article at first, he had tried more recent experiments with what was pronounced by Dr. Rich to be a perfect article, but after filling a cavity with it he had found it was not sufficiently hard.

Dr. RICH considered that experiment as an imperfect one, the tooth being held in the hand while filling, and being filled merely for the purpose of showing the manner of doing it. He considered it necessary to have instruction and experience in order to use this article, it requiring different handling from gold foil. He had met with decided success in using it, and thought Dr. Townsend's failure could be accounted for without condemning the crystalline gold.

Dr. DWINELLE, in answer to a question as to how much he had used of it in the mouths of patients, said he had used pounds.

Dr. RICH had used five or six ounces.

Dr. TOWNSEND had used two ounces in filling teeth for his patients, and as far as he could ascertain, the fillings were all bad—most of them having since been refilled.

The subject was further discussed, and misapprehensions corrected as

to the nature of the article and method of its preparation—some gentlemen having mistaken, as it was contended gold precipitated by a process discovered by Dr. Jackson, of Boston, for the more recent article, which had been tested and found to contain 999 and 8-10th of 1000 parts gold. The process was a secret.

During the course of the afternoon, Dr. BEALE, of Philadelphia, rose to speak, and upon the Chair's announcing his name, he was greeted with a round of applause.

Adjourned to nine o'clock to-day.

In the evening an entertainment was given to the members of the profession by Jones, White and McCurdy, at the Astor House.

THIRD DAY.—MORNING SESSION.

The Convention met at 9 o'clock; the subject under discussion being THE BEST PREPARATION OF GOLD FOR FILLING TEETH.

On motion of Dr. TAFT, the Convention agreed to close the discussion upon the subject at 12 o'clock

Dr. DIXON, of Pottsville, Pa., was fully satisfied that those who were in the habit of using crystalline gold were capable of making the best fillings with that substance, while others who had not had much experience could do better with foil. He was opposed, however, to shifting about from one substance to another, and practicing experiments upon their patients, who must suffer thereby. The experimenting ought to be left to those who could do it without running risks. He had not used crystalline gold much, from the fact that he had not the physical strength that seemed to be required for its use.

Dr. ROBERTS, of New York, said that there were radicals in the dental profession as well as in politics. He had tried everything for filling, and he had found that in some cases sponge or crystalline gold could be used, where foil could not be used as well, while in other cases foil was best adapted. He practiced on the eclectic principle in this respect.

Dr. KINGSBURY, though he believed both substances were good, preferred gold foil. He thought there was a disposition to ascribe too much to sponge gold, though in some cases, no doubt, most excellent work could be done.

Dr. BUCKINGHAM, of Philadelphia, made some criticism upon the idea that a filling of sponge gold was perfectly solid. The term was usually applied to metals where the particles were held together by cohesion. That, however, was no evidence that the largest amount of matter was contained in a given bulk. In his own practice he had not been very successful in the use of sponge gold, the fillings having broken away in some cases, where they appeared perfectly solid—they washed away like clay. He thought vitrefaction or fusion was required to make a filling perfectly solid. He had seen fillings of sponge gold where a drop of moisture upon the unburnished surface was absorbed.

Dr. WEEKS, of New York, preferred crystalline gold in shallow cavities that were easily accessible, but gold foil for deep cavities not easily got at.

Dr. AUSTIN, of Baltimore, in answer to a remark of Dr. BUCKINGHAM,

that fusion by fire was necessary to weld gold, said he looked upon that as a question to be settled by experiment.

Dr. ASA, of Philadelphia, had tested a filling made with sponge gold by the hammer and rollers, making it into a very thin plate. He happened to have that specimen in his pocket-book, which he exhibited to the Convention. He considered the test a complete one. He had yet to see the first indication of a failure in the work he had done.

Dr. WATT, of Ohio, rose to correct the statement of Dr. BUCKINGHAM, about the impossibility of welding gold except by heat Gold was one of the welding metals without heat, as every worker in it knew.

Dr. RICH stated that not only gold, but tin and lead, were weldable when cold.

Dr. WHITE remarked that two things should be kept in view in all these operations, in order to judge of their success—first, the thoroughness of the operation, and second, the skillfulness of the manipulation.

Dr. CLARKE, of New Orleans, would undertake to build up a five cent piece into the shape of a thimble by gold foil of even layers and straight, smooth laminæ with the pressure of five pounds only, or twenty five, with serrated instruments. He had, however, seen a remarkable instance of the use of crystalline gold by Dr. ALLPORT, where the front incisors were separated as if a file had been passed between them a quarter of an inch thick, nearly down to the gum. These teeth had been built up until their approximate edges almost touched, and they were perfectly adapted to mastication. They had been used nineteen months. He understood that Dr. ALLPORT used foil in connection with crystalline gold in the same cavities.

Dr. ALLPORT stated that in building up teeth where two sides were standing, he used more cylinder than crystal gold. Every man must use his own judgment. The great thing after all in filling teeth, was the exercise of sterling common sense [Applause]. If crystal gold crumbled or softened, he thought it must be due chiefly at least to the manner in which it was used.

Dr. ANTHON, of Philadelphia, had tried crystalline gold, and with success, but had now abandoned it, its use having led him to an important discovery in the preparation and manner of using foil. He had been led to infer that if gold foil could be made to adhere in the same manner as sponge gold, it would prove equally as good. It was well known that after exposure to the atmosphere gold foil lost its adhesive property; that adhesion could be restored by subjecting it to a slight degree of heat over a spirit lamp—somewhat short of a red heat.

The subject was further discussed by several gentlemen until twelve o'clock, when, by resolution, the Convention took up the subject of IMPROVEMENTS IN DENTISTRY.

Dr. W. B. ROBERTS, of New York, exhibited a set of teeth, made by a new and improved process. He remarked that there were five important requisites in the construction of artificial teeth, to wit.: 1. Cleanliness; 2. Restoration of speech; 3. Restoration of the features; 4. Durability and utility; 5. Natural appearance, or resemblance to the natural teeth and gums. In the ordinary artificial plates and teeth only

one of these requisites was obtained, which was utility or durability; the work was, therefore, far from being what was demanded. The specimen which he exhibited was manufactured so as to form a continuous gum, firmly cemented upon a plate of platinum, presenting a most perfect resemblance to the natural gums and teeth. The teeth are first arranged in the ordinary way, and the interstices then filled with a composition very similar to that of the mineral teeth, which fuses, however, at a lower temperature. The whole is then placed in an oven, where the cement fuses, making a solid, strong piece of work. Platinum is required to be used instead of gold plate, as in the heating operation the gold would melt.

Dr. LOOMIS, of Cambridge, Mass., presented a specimen of artificial teeth, for which he claimed superiority, dispensing with a metallic plate and substituting a mineral base, the whole forming a solid piece.

Dr. WHEAT, of New Haven, produced a specimen of teeth inserted in hard rubber compound. The hard rubber was perfectly free from any liability to absorption, and it was impossible to break the teeth so inserted, especially the grinders.

Dr. MALLETT, of New Haven, presented another specimen, made in a similar way, which he and his partner had, he believed, perfected.—There was nothing but mineral teeth and hard rubber used—no metal. He proceeded to describe the method of preparation. The last two specimens exhibited, did not present, as we observed, the natural appearance of the gums; and in the first case, we were told that the assistance of a certain individual was necessary to perform the work, so far as the rubber was concerned; and in the last case, the vulcanization being done by the dentist himself, it was necessary to purchase the right of Mr. Goodyear.

Dr. FRANKLIN, of Newark, exhibited a fluid lamp, adjusted on a balance, with an inverted syphon running from the cup to the wick. It was so adjusted that as the fluid became exhausted, the part containing the wick gradually lowered, causing a uniform flow of alcohol. It had also the advantage, from the arrangement of the syphon, of being perfectly safe from explosion. When the lamp is not in use and the cap is put on the wick, then, the wick part being the heaviest, it was kept in a horizontal position by a spring underneath.

Dr. MALLETT exhibited an adjustable instrument for punching two holes, one punch being movable. It was used for punching two holes in the plates suited to the pins in the artificial teeth.

Dr. HARRIS, of Baltimore, exhibited an instrument invented by Dr. Putnam, for producing local anæsthesia, very useful for extracting teeth without pain.

Dr. PUTNAM stated that he had extracted three or four thousand teeth with aid of this instrument. The agent used was ice and salt, and the instrument was so contrived that the application could be made to the smallest portion of any external part of the body. It was a singular fact, he remarked, that when applied to the gums it produced no pain, as it did to the outer surface of the body. The gums were frozen by the application, and the teeth extracted without the slightest pain, and with

no bad consequences. It required but two minutes usually to effect the purpose—at most three or four.

AFTERNOON SESSION.

The Convention resumed the subject of the best preparation of gold for filling, which was discussed for a part of the afternoon.

Dr. McQUILLAN, of Philadelphia, was against the use of sponge gold, not having been successful in using it.

Drs. BALLARD, TAFT and HARRIS, spoke in favor of its use in some cases.

Dr. RICH took a decided stand in its favor, having subjected it to the most thorough tests. The causes of failure could all be explained, in his opinion, without condemning the article. It was true that some of the gold was defective, but he was assured that the defects could be obviated by proper care in the manufacture. It was a mistake to suppose, as some had done, that this article required longer time or greater strength in the operation of filling. He believed he saved both time and strength in its use.

The subject of the place of meeting next year came up, and it was decided, by a vote of 56 to 40, that it be at Boston.

Dr. TAFT, of Ohio, exhibited a blow-pipe for throwing a warm jet of air into cavities for the purpose of drying them. It consisted in an india rubber bag, with a metal tube attached, which might be filled with a heated substance that would retain heat well, the air passing through it by pressing on the bag.

There was also exhibited an instrument to enable dentists to get a more perfect articulation of teeth.

After disposing of other business, the Convention adjourned to meet next year at Boston.

In the evening a supper was provided at Dodworth's Hall, being given by the Dentists of New York and Brooklyn to their brethren from a distance.

In the April number of the "News Letter," we find the following, aimed at one of the Actuaries of the New York Teeth Manufacturing Company:

"GREAT IMPROVEMENT IN DENTISTRY, by S—— C——." Here is a Pamphlet, with the above title, of six printed pages, about *three by four inches.* To review it, would require only enough space to say *bosh*, but we are not inclined to "kill it with faint praise," as it has an importance in being the type of numerous publications of like character, (though scarcely so bald,) in which the writers puff themselves ad libitum.

Another feature is that of adding testimonials from others; the style of one which we find here—also typical—purporting to come from "one of the examining committee on dentistry in the New York Crystal Palace," embodies every thing the "*puffer*" could possibly desire, and is signed with something like the following name—*Dr. Jacobus Mustachio Crowellen.*

We must give one extract, at least, before placing this weighty tome in our cabinet of curiosities.

'In addition to the above, I have also discovered a decided improvement in the administration of ether; it is compounded with another ingredient, which I believe is only practiced by myself, and makes it so harmless, that the most delicate patient may fear no injury or serious consequences.'"

In the July number, he gives us another dose of the same, intended, of course, for another member of the same firm. After quoting the remarks made by the editor of the "Obturator," upon Solymon Brown's valedictory address, he says:

"The claim, therefore, set up by the author of the valedictory, seems to us simply very extravagant, entirely unwarranted, and calculated to do harm."

Our readers will smile when they read the following lecture, which these gentlemen are *thoughtful* enough to bestow upon the editor of the Recorder:

"*New York Dental Recorder.*—In the number for April we find an editorial noticing the then contemplated formation of a Dental Society in St. Louis; also the establishment of an Association in Michigan, the past winter, after which he goes on to say:

'This is a step forward. Who will help the Dental profession in New York to a little "brotherly love?" Why cannot a Dental Society be established? Have we not the men? Then we have *no Dentists* worthy of the name. What is to prevent us from establishing a useful and respectable association? Who is there ready to sacrifice self interest—personal jealousy—vain glorious pride, and many other *useless* things for the sake of benefitting the profession to which we all owe so much? If there are *any such*, then we have the men who can and who *ought* to take the initiative in this direction. Dentists of the City and State of New York, let us hear from you on this subject.'

"Now every word of this we can fully endorse. It breathes the right spirit, and adds strength to the hope that all estrangements may be removed, and unity of action and feeling take the place of selfishness and antagonism. But, alas, alas! (what forgetful mortals we are,) a change takes place, for in the succeeding or May number, we find an editorial which we must deem, to use the mildest term, discourteous to a valued correspondent of ours, and evincing anything other than a spirit of "brotherly love," or brotherly feeling, and which, under the circumstances, is unkind and ungenerous and much to be regretted; and the facts amply warrant the paraphrasing the editor's words in the above quotation, as follows: "who will help the editor of the New York Dental Recorder to a little brotherly love," or a degree of respect for those who may honestly differ with him in practice or opinion. Oh, for a little 'brotherly love.'"

Whatever authority the editors of the "News Letter" may have for thus taking in charge the morals of the Dental profession, certainly they do not derive it from Matthew, 7th chap., 1st to 5th verse.

ERRATA.

Page 151—10th line from bottom, after "*infiltrated*" should be a comma.

Do. 2nd line from bottom—for "*abscess*" read "*absence.*"

Page 156—2nd line from top—for "*joint*" read "*point.*"

Page 157—4th line from bottom—after "*sudden*" read "*but the two.*"

New-York Dental Recorder;

DEVOTED TO THE THEORY AND PRACTICE OF

Surgical, Medical and Mechanical Dentistry.

Vol. X.] SEPTEMBER, 1856. [No. 9.

METALLIC DIES. By Professor P. H. Austen.

* (Continued from page 255, vol. IX.)

The table on page 197 is designed to present in one view the relative value of certain metals and metallic alloys, in respect of the three properties—fusibility, hardness, contractility. In expressing the composition of the alloys the initials of the English names are used, not as in chemical works, of the Latin names.—This is done because to the majority of readers, the initials A. L. T. will more instantly suggest the names, antimony, lead, tin, than the corresponding Latin initials, Sb. Pb. Sn.

The scale of fusibility is prepared in part from reliable sources, and in part from direct experiment. The scale is expressed in round numbers. In the case of lead, one authority gives 594°, another 612°; 600° is nearly the mean between the two. In the case of zinc, 773° is the fusing point according to Daniell, and 1996° that of copper. In the first place, it is very doubtful whether these high temperatures can be ascertained exactly to a degree; in the second place, the design of this table does not require such exactness.

The scale of hardness has been carefully prepared in the manner described on page 227.† A hammer of 7 lbs. weight, falling from a height of nine inches upon a steel punch 1-6th inch in diameter, indented the several samples of metals, ¼ inch thick, placed on a heavy anvil. The depth of the indentation is expressed in thousandths of an inch, and is in each case the average

*Erratum.—In Sept. No., 1855, page 203, 8th line, for " variety and consequently costliness," read scarcity and consequent costliness. This conclusion of our article having been greatly altered from the original report, is worded in terms more suited to the readers of the Journal.

† The references in this number are to the 9th vol.

of from 6 to 12 trials. For example, in nine samples of zinc, the punch sank to the depths respectively 17, 20, 17, 17, 18, 18, 20, 18, 18, a difference so slight as to confirm rather than invalidate the accuracy of the experiments.

The micrometer screw used in these experiments was made by Mr. John Jones of this city, and works with most beautiful accuracy. The screw has 40 threads (square cut) to the inch, and carries on its head an index which moves over a circle graduated into 25 parts. These divisions, being about a $\frac{1}{4}$ of an inch apart, are easily read, and register each, 1000th part of an inch. The readers of the Journal will obtain a correct idea of these minute divisions of an inch from the following statement. Each leaf of the Journal is 5-1000th of an inch thick ; 10 leaves, (20 pages,) 5-100ths ; the thinnest letter paper, about the 1-1000th. The shrinkage of an average sized zinc die from outside to outside of the alveolar ridge, measuring two inches, will be 27-1000ths, being on each side a space nearly equal to the thickness of three Journal leaves. From inside to inside of the lower jaw, we have about the same average. In the first case, the plate would "bind," and if the ridge were covered by an unyielding mucous membrane, it would prevent accuracy of adaptation. In the second case, the plate would have too much lateral "play," and consequently lack stability. Again, in a moderately deep arch, say a half inch in depth, the shrinkage between the level of the ridge and the floor of the palate will be nearly 7-1000th—rather more than one leaf of the Journal. In the deepest arches this shrinkage becomes a serious difficulty ; in the shallower cases, it is not of much moment, as there is no mouth so hard as not to yield the 1 or 2-1000ths of an inch.

It is scarcely necessary to remark, that the softer the metal the higher its number in this scale. In the columns of contractility and fusibility, the lower numbers represent those metals which are most fusible and have least shrinkage. The metals and alloys enumerated have a very different value in the three scales ; of course the intrinsic value of any one must be determined by the relative importance of these three properties, in consideration of the purpose to which it is to be applied.

The scale of hardness has been prepared with much care, be-

cause it is the first, to the writer's knowledge, ever attempted.—We find, as intimated on page 203, in most works on metals, a "Scale of Hardness," but this indicates not resistance of the metal under a blow, but merely the comparative ease with which it may be scratched. In this scale, the six metals stand in the following order: copper, bismuth, cadmium, tin, antimony, zinc, lead; an order that does not indicate correctly their relative value to the dentist.

Cadmium, antimony and bismuth do not appear in the table. The first, because of its scarcity and costliness, and the two last, because of their extreme brittleness, are not adapted to practical use. Antimony and bismuth both rank lower in the scale of hardness than zinc, but they were too brittle to stand the blow of the hammer, and no indentation could be obtained by measurement of which they could be compared with any accuracy. Lead is in reality softer than its number 138 would indicate. Experiments with an ingot $\frac{1}{2}$ inch thick, place it as high as 144, being exactly 8 times softer than zinc. This is the only case in which the increased thickness of the ingot affected the result.

The scale of contractility is expressed in decimal fractions of an inch, and indicates the amount of contraction, per linear inch, that takes place in each metal between its point of fusion and a temperature of 74°. The scale is made by careful measurements of ingots 3 inches long, $\frac{5}{8}$ inch wide and $\frac{1}{4}$ inch thick, poured into a soap-stone ingot mould. The ingot mould of soap-stone has the two fold advantage of retaining its heat, so as not to allow the metal to chill too suddenly, and of not itself expanding by heat. A metallic ingot mould would, by its own expansion, either destroy the accuracy of the experiments, or at least would greatly complicate the process. The writer proposes in the repetition and extension of these experiments, to use plumbago instead of soap-stone, as being possibly more entirely free from any expansion. The scale here given may, however, be relied upon as sufficiently accurate to guide in the choice of metals.

In Ure's Dictionary, and elsewhere, may be found tables giving the linear expansion of metals between 32° and 212°. Assuming the ratio of expansion to be uniform up to the melting point, it is easy to find the total expansion (or contraction) of each metal. We should thus have the total contraction for zinc,

.01162; for lead, .00858; for tin, .00495. The results by calculation are, in all three cases, a little less than those deduced from experiment—a discrepancy arising from the fact established by Lavoisier and Laplace, that solids as well as liquids expand in an increasing, not in a uniformed, ratio.

From the various tables alluded to, we find the average contraction of the 10 following metals and alloys, between the boiling and the freezing points of water, to be for

Platinum,	.00091	Gun metal	.00182
Antimony	.00108	Brass	.00191
Cast iron	.00111	Tin	.00286
Bismuth	.00189	Lead	.00285
Copper	.00180	Zinc	.00298

An examination of this table, and comparison with the following one, give us some interesting facts.

On page 254, volume IX, a very common error with respect to the effect of antimony, in type metal was noticed. We here see, not that antimony expands under decrease of heat, but that its rate of contraction is to that of lead nearly as 1 to 3, and that, when added to lead in the proportion of 1 to 5 it diminishes the total shrinkage nearly one half. Antimony, iron, bismuth and zinc may all, in the moment of passing from the liquid to the solid form, by virtue of their crystalline tendency, slightly expand, and so fill the fine lines of a delicate matrix; but, once solid, they obey the universal law, and contract under decrease of temperature.

Again we see verified the statement made on p. 228. The actual shrinkage of a metal is dependent not only upon its ratio of contraction, but also upon its point of fusion. Tin, with a rate of contractility more than twice that of iron, has not half the actual shrinkage. Zinc contracts more rapidly than copper or brass; yet, starting from a lower temperature, its total shrinkage is much less.

	Melting Point.	Contractility.	Hardness.	Brittleness.
1 Copper	2000°	.02286	.020	1
2 Brass 2 C—1 Z	1870°	.02216	.024	2
3 Zinc	770°	01366	.018	5
4 1292 Z—579 tin	660°	.01233	.024	4
5 Lead	600°	.01066	.138	1
6 5 type metal 5 L—1 A	500°	.00633	.045	10
7 Tin	440°	.00633	.054	1
8 2 L—1 T	440°	.00633	.050	3
9 1 L—2 T	340°	.00500	.040	8
10 2 L—3 T—1 A	420°	.00433	.026	7
11 5 L—6 T—1 A	320°	.00566	.035	6
12 5 L—6 T—1 A—3 B	300°	.00266	.030	9
13 1 L—1 T—1 B	250°	.00066	.042	7
14 1 L—1 T—1 B	250°	.00066	.035	6
15 5 L—3 T—8 B	200°	.00200	.045	8
16 2 L—1 T—3 B	200°	.00133	.048	7

The last column contains an approximate estimate of the relative brittleness of the 16 samples given. As in the other columns, the low numbers represent the metals, so far as this property is concerned, most desirable. Those marked below 5 are malleable metals; those above 5 are brittle; zinc, marked 5, separates these two classes and belongs to one or the other, according to the way in which it is managed. Melted and poured into a shallow mould, it may be broken. Even in the more compact form of a well shaped die it is possible by undue violence to crack it; an accident the liability to which is necessarily increased, when the die is made too shallow or too flaring. Meeting with some such vexatious accident, one might well ask, taking in hand a piece of sheet zinc and bending it in any direction, if these two can be one and the same metal. The only difference is that sheet zinc is annealed zinc. By annealing zinc, we take it out of the class of brittle metals, and fit it for the malpractice of the most unskillful operater; not meaning to say that the most skillful may not at times gladly avail himself of the change. In the manufacture of sheet zinc it is rolled at a temperature between 212° and 300°, retaining its malleability when cold. This change from the brittle to the malleable state takes place at about 230°; continues unchanged up to 300°. After this it becomes less malleable, and at 450°, or the melting point of tin, it becomes again brittle. The simplest way to anneal a zinc die is to place it in the melting ladle with about a table-spoonful of water, removing it in 30 seconds after the water has boiled away. If the fire is a very hot one, remove it immediatly on the disappearance of the water. It will often happen that the die is annealed in the process of taking the counter-die. This will more certainly occur when *Nos. 7, 8 or 9 are used for the counter.—For example, take tin: using a mass twice the size of the die, should it be heated to 540°, (100° above melting point.) it would not, allowing for loss of heat by radiation and contact with the cast iron ring, (if one be used,) heat the zinc beyond 330°. Lead, cast as cool as it could possibly be poured, unless in a very heavy ring (such as a "cart wheel box") or in quantity too small for a well shaped counter, would be apt to rise the zinc at least to 400°,

*When metals are named thus by numbers, reference is had to the table on page 197.

and so impair its malleability, whilst, if poured as hot as many are in the habit of doing, the zinc will remain as brittle as when first cast.

The other brittle metals and alloys may be rendered somewhat less brittle by immersion in boiling water, except the two last.— In the course of the experiments necessary to the preparation of this report, a number of alloys, valuable in respect of fusibility, contractility and hardness, were found useless because brittle.— Further experiment may enable us to assign to some of these the requisite toughness. Meanwhile it is hoped that the table here given may induce others to prosecute inquiries for themselves.

The design of this report being rather to offer practical suggestions than to indulge in theoretical refinements, I have taken the metals as they are found in commerce. The copper of commerce almost always contains traces of arsenic, nickel and tin, which impair its malleability. Commercial zinc always contains iron, lead, copper, cadmium. Block tin generally contains antimony, copper or lead. Lead is usually nearly pure. Of course these impurities affect more or less the properties of the metals; but practically they may be disregarded except when, as in No. 4, we wish to make an alloy of very exact proportions. This is a mixture of 40 atoms of zinc to 10 of tin, and is the only instance in the table of an attempt to unite two metals in their atomic proportions. Theoretically such mixtures are the most perfect; but practically there is a two-fold difficulty; first, a want of absolute purity of the metals which necessarily destroys the accuracy of the proportions; secondly, the impossibility of calculating with absolute certainty the loss by oxydation of the more fusible component of the alloy. Hence, in the composition of the brasses, bronzes and pewters it is usual to make such additions of the separate metals to a lot of old alloy, as the judgment and experience of the founder may dictate, due allowance being made for the burning out of the more fusible metal.

The slight commercial impurities of copper, zinc, lead and tin may, in the making of metallic dies, be safely disregarded by the dentist. A much more important point is the necessity of using clean melting ladles, and of having more than one. Take in illustration a very common case. Zinc is melted in a ladle

containing the remnant of a previous melting of lead. The lead, so much the heavier, remains at the bottom of the ladle, and, if *all* the metal in the ladle be poured, sinks to the bottom of the mould. The die is taken from the sand when the zinc has set, and the more fusible lead runs out, leaving the die imperfect on its face: or if allowed to cool entirely, it will, while apparently perfect, have a part of its alveolar ridge composed of lead; consequently too soft to swage the plate. This accident may be avoided in either of three ways: use separate ladles; or avoid pouring all the metal, which leaves the heavier lead in the ladle; or use tin for the counter-die. In the last case the zinc readily alloys with any remnant of tin, having very nearly the same specific gravity, and the only result, from repeated meltings, will be a softening of the zinc in proportion to the tin added.

In the use of the more fusible alloys of the table, from type metal down, a copper ladle and spirit lamp will suffice for their fusion. In fact, flame heat will be better than an anthracite or charcoal fire, from the less liability of overheating. Excess of heat wastes the more oxydizable metal and alters the proportion of the alloy; and where a copper ladle is used, a coal fire will very quickly raise the metal to a temperature, at which it will alloy itself with the copper, destroying the ladle and letting the metal quietly down into the fire. There is a tinned iron (hammered, not sheet-iron) ladle of French manufacture, very convenient in size, very durable, and not liable to this last accident attending the careless use of copper. In using either the tinned iron or copper, the ladle should after each melting be instantly scraped with a spatula or wiped out with paper or shavings: otherwise the proportions of the alloys, where several kinds are used, will become changed.

Most of our readers may prefer to draw their own inferences from the table given, and select such metals or alloys as may best suit their particular views, convenience or custom. And the scope of this article would be greatly mistaken if we should be understood as wishing otherwise, or as dictating to any one a method or material suitable for all cases. A few suggestions, however, may not be amiss. Our concluding observations upon the properties of metals will be more conveniently made by

taking them seriatim, as given in the table, interposing some brief notice of metals and alloys not found there.

Iron.—Fuses at 2786°, sp. gravity 7.78. Cast iron ranks as a brittle metal, but in the solid form of a die would resist any necessary force. Having a surface hardness almost equal to steel, it would admirably suit the dentist, but for two serious objections its high fusion point and its consequent great contractility : we might also add its roughness of surface, which in so hard a metal would indent the plate. As a component of alloys, it is used in small quantity to harden copper, and most probably the zinc of commerce may owe a slight increase of hardness to the trace of iron it contains.

Nickel.—Never used in the arts in its pure state. Less fusible than iron, it diminishes the fusibility of the alloys of which it is a component. It is chiefly used in the manufacture of German silver, albata, the *white silver* of the Chinese, &c., all of which are too infusible, contractile and costly to be used for metallic dies. We have made no attempt to alloy it with the more fusible metals.

Copper, Brass, Bronze.—The two first are shown in the table to be inferior to zinc in hardness, decidedly inferior in fusibility, and much more contractile. Zinc, superior in all except its brittleness, when made tough by annealing, is therefore unquestionably preferable to either. For the purpose now under consideration we should entirely exclude from the laboratory, copper, or any of its various alloys with zinc, forming brass, Bath metal, sheathing metal, pinchbeck or mosaic gold. The hardness of zinc will be increased slightly by the addition of 30 or 50 per cent. of copper, but it increases also the shrinkage, and makes it harder to melt.

The alloys of copper with tin, forming bronze, gun metal, bell-metal, speculum metal, &c., have the advantage over those with zinc of being very much harder. They are all however, more brittle, and are all as objectionable on the score of infusibility and shrinkage. To those wishing to make trial of bronze we would recommend alloys of 6, 8, 9, 10 and 12 copper to 1 tin. The first is most brittle, the last is softest. In melting, care must be taken to prevent the waste of the tin, which readily takes place at the

high temperature of melted copper. The purest "grain" tin and Swedish copper should be used in making bronze. 2 tin and 1 copper, form what is called "temper," and may, perhaps, be advantageously employed in hardening tin, using 1 part temper to 100 parts tin. The formulæ given in the table for hardening tin are, we think, better, because more readily fused.

The alloys of copper and tin, if not very useful to the dentist, are interesting as illustrative of the remarkable results that so often, in the alloying of metals, defy all attempts at *a priori* reasoning. There are some general rules that may measurably guide in originating or in modifying alloys—the physical properties of the components, entering, as it were, into mutual compromise. Thus we expect to find the alloy of 2 brittle metals itself brittle—so it always is. A brittle metal, if in equal parts, will usually render a tough one brittle: if either be in excess, the result will vary accordingly—the brittle metal, however, having always the more influence.

Alloys of two ductile metals defy all calculation as to their probable properties. Copper is highly ductile, and tin is very malleable; while speculum metal (2 C—1 T) is the most brittle of all alloys. Gun metal (9 C—1 T) is tough and rigid, neither malleable nor ductile: by adding tin, the *softer* of the two metals, the alloy is actually hardened, until, in the proportion of speculum metal, it cannot be cut with steel tools. Again, 6 C—1 T will not stand a heavy blow, yet its cohesive stength is twice as great as either component: and 1 bismuth, 4 tin has a cohesive strength 5 times greater than bismuth and 3 times greater than tin. In the case of ductile metals, where mixed in nearly equal parts, about half the alloys will be ductile, and half will be brittle; where either metal greatly predominates, the alloy is usually ductile: but the ductility of an alloy is seldom, if ever, equal to that of the more ductile constituents.

The influence of alloying upon fusibility is also remarkable. The alloy is invariably more fusible than the most refractory component, and often than the less refractory, provided the latter does not exist in too small quantity. Silver solder is a familiar illustration; copper less fusible than silver, makes the silver itself more fusible. So, again, the soft solders, except where the lead is in excess, are more easily melted than tin. But only actual

experiment could have revealed the remarkable fact that certain alloys of lead tin, bismuth, fusing respectively at 600°—440°, 500° will melt in boiling water.

[TO BE CONTINUED.]

ON CERTAIN CONDITIONS OF THE DENTAL TISSUES.

By JOHN TOMES, F. R. S., Surgeon-Dentist to the Middlesex Hospital.

[Continued from page 179.]

OBSERVATIONS ON THE STRUCTURE OF THE ENAMEL.

Without going fully into the structure and development of the enamel, and into the citations of the opinions published upon the subject, I wish to take this opportunity of recording certain observations which I have made upon the structure. The transverse striation of the enamel fibres has been frequently remarked, but the cause of these markings has not been determined. If sections from a number of teeth be examined, it will be found that the striæ are much more strongly pronounced in some specimens than in others, and most especially so in those in which parts of the tissue have a brown color when seen by transmitted light.

The markings crossing the direction of the fibres are of two descriptions. The one arranged in contour lines, and situated at irregular distances from each other, uncertain in number and extent, and sometimes altogether absent. The other kind minute and regular, extending from fibre to fibre, and strongly resembling the transverse markings in voluntary muscle. In the present instance my remarks will be confined to the latter kind of markings.

In unhealthy subjects the permanent teeth, when they appear through the gums, are not unfrequently destitute of the brilliant white color common to the finely-developed organs of a healthy child: on the contrary, they have an opaque yellow color. If such teeth be selected for examination, we shall find that the sockets, when reduced sufficiently thin to be seen by transmitted light, present in the enamel a confused opaque appearance; but if a tolerably high power be used (such as the quarter or eighth object-glass) in conjunction with a strong light, the dark appear-

ance will resolve itself into a series of lines; the one set marking the course of the fibres, the other taking the direction of the transverse *striæ*. The two sets of lines crossing each other at right angles leave interspaces approaching a square form. These interspaces are fitted with granular masses, having the appearance of cells. By treating the section carefully with dilute hydrochloric acid, these appearances become more distinct, and we then have series of parallel fibres composed of distinct sheaths, each containing a line of granular cells or meshes arranged in a single series, presenting a strong resemblance to the ultimate fibrilea of muscles. That such is the true structure of enamel is, I think, satisfactorily proved by specimens in my collections, some of which show the cells or granular masses; whilst others show the sheath, with the contents removed. Other specimens, again, show the enamel fibres in the very young subject, deprived of their salts, detached from each other, and floating about in the fluid in which the section is preserved.

The figures illustrating these forms were drawn from specimens which retain the conditions figured. The appearances described do not admit of dispute; but the interpretation of their origin may perhaps be differently given by observers who do not agree upon the manner in which the enamel is developed. I do not propose to enter upon the question of development; but shall for the present leave the subject, after stating the varying conditions of enamel as it is found in human teeth.

In well-formed teeth, although the cell-like markings in the enamel are not by any means as distinct as in teeth in the condition I have described; yet having first examined the latter, but little difficulty will be experienced in recognising here and there faint indications of a similar structure, especially if the light be well managed. The more perfect the development of the tooth, the more transparent and free from markings will be the enamel, when seen as a microscopic object; and the less perfect the more distant will be the columns of granular cell-fibres.

Examples may readily be found in which the union between the enamel fibres is so defective that the tissue readily breaks down; a condition rendering it very difficult to grind it sufficiently thin for microscopic examination. When obtained, however, such specimens are very instructive, as they show distinctly the

individual fibres and their contents, which in the most highly-developed tissue are so perfectly fused together, that the strongly-marked distinction of parts, which is so obvious in the one, is almost entirely lost in the other.

From what has been stated it will be seen that my view of the structure of enamel is as follows :—

The enamel fibres are composed of a sheath containing a series of cells or masses ; that in perfectly-developed enamel, the cells or masses and sheaths are so blended that but slight distinction of parts remains, but that in less perfectly developed tissue the component parts remain visible.

ON THE DEVELOPMENT OF THE ENAMEL.

Before proceeding with this article, which was commenced in the last number of the Journal, I must take the opportunity afforded by the publication of the second part to correct certain typographical errors which have crept into the last pages of the first. The first error is somewhat important, as it makes me contradict a previous statement. At page 102, (*a*) and in the ninth line, *not* is left out after the word *contracted;* and in the tenth (*b*) line after the word dentine, *or* has been substituted for *but.* At the fifth (*c*) line from the bottom of the page, *alteratives* has been substituted for *alterations.* In page 103, (*d*) at the twentieth line from the bottom of the page, the word *sockets* has been printed instead of *sections;* in the eleventh (*e*) *fitted* for *filled;* in the seventh (*f*) *meshes* for *masses;* and in the fifth (*g*) line from the bottom of the page *fibrilea* for *fibrillæ.* In page 104, (*h*) *distant* will be found instead of *distinct* in the eighteenth line from the bottom of the page.

The latter part of the preceding paper referred to the structure of the enamel when fully formed. It is proposed in this communication to enter upon the manner of formation.

Mr. Huxley, in an able article published in this Journal (No.

102, *a.*	Refer to August No. of RECORDER, page 179, third line from top.								
Tenth, b.	Refer to August No. of RECORDER, page 179, third line from top.								
Fifth, c.	"	"	"	"	"	179, fifth	"	"	bottom.
103, *d.*	"	to this	"	"	"	202, second	"	"	"
Eleventh, e.	"	"	"	"	"	203, eighth	"	"	top.
Seventh, f.	"	"	"	"	"	203, twelfth	"	"	"
Fifth, g.	"	"	"	"	"	203, fourteenth line from top.			
104, *h.*	"	"	"	"	"	203, second line from bottom.			

III., 1853,) entered very fully into the history of the subject, giving a clear account of the different views which have been promulgated, and citing the authorities for each. Under these circumstances it will not be necessary for me to go over the same ground. I will, therefore, refer the reader to the pages which contain Mr. Huxley's paper, in place of reprinting his historical matter.*

After adopting this arrangement, that part of Mr. Huxley's paper which gives his own views on the development of the enamel, together with that which has been subsequently written upon the same subject, alone remains for consideration.

Prior to the appearance of Mr. Huxley's essay, it was pretty generally believed that the enamel fibres were formed by the direct calcification of the columns of the enamel organ. This opinion has, however, been shaken by a discovery made by that distinguished physiologist. He found that a membrane can be raised from the surface of the enamel, at any period during growth, by the addition of an acid; the membrane being external to the enamel fibres already formed, and internal to the enamel organ—in fact, lying between and separating the two tissues. This membrane Mr. Huxley regards as the *membrana preformativa* of authors. He describes it as perfectly clear and transparent, and as being continued over the dentine in those parts where enamel has not been formed, and over the dentinal pulp where dentine has yet to be developed, giving it in fact the position which the basement membrane of the mucous membrane of the mouth would occupy when the tooth-pulp is in the follicular stage, and consequently in the sacular stage, supposing such membrane to exist in the one case, and that it has not disappeared in the other. These points are shown in the figures illustrating Mr. Huxley's paper.

M. Lent, a pupil of Kölliker's, published a paper on the development of the dental tissues, which was subjected to the Professor for revision.† Hence it must be regarded as express-

* On the Development of the Teeth, and on the Nature and Import of Nasmyth's "Persistent Capsule;" by Thomas H. Huxley, F. R. S.—"Quarterly Journal of Microscopical Science," No. III., 1853.

† 'Ueber die Entwicklung des Zahnbeins und des Schmelzes,' von Eduard Lent, Stud. Med. aus Hamm.' 'Zeitschrift fur Wissenschaftlichs Zoologie Sechster Band.' p. 121, 1855.

ing to some extent the opinions of M. Kölliker as well as those of M. Lent. The account there given of the development of the enamel is in the main but a confirmation of Mr. Huxley's statements, the points of difference being unimportant. M. Lent describes the so-called *membrana preformativa* as structureless, but as it were indented with the ends of the enamel fibres. His figure shows a surface impressed with minute square depressions. Mr. Huxley gives a similar figure. The latter author says: "Neither the capsule nor the enamel organ take any direct share in the development of the dental tissues, all three of which—viz., enamel, dentine, and cement—are formed beneath the *membrana preformativa*, or basement membrane of the pulp." In another place he says: "Neither the capsule nor the "enamel organ," which consist of the epithelium of both the papilla and the capsule, contribute *directly* in any way to the development of the dental tissues, though they may indirectly."

M. Lent believes that the enamel organ exerts some direct influence in the formation of the enamel, and puts forward the following hypothesis, viz: that the cells of the enamel organ secrete a fluid, which passes through the *membrana preformativa* and there forms enamel, and he assumes that the secretions of individual cells are independent, each one forming or corresponding to an enamel fibre.

I have latterly been occupied with this subject, but have for the most part confined my investigation to young and fœtal teeth of the human subject. I must, therefore, be understood to speak of the enamel of human teeth.

The method of investigation has been that indicated by Mr. Huxley and M. Lent; and in the pursuit of the subject I have endeavored to trace the development of the tissue without reference to its homological relations, under the belief that the structure and development of a tissue should be perfectly understood before assigning its place among other structures.

The investigations were commenced upon the lower jaw of a nine-months' fœtus, which had been in spirit for some weeks. On placing an incisor under the microscope, the surface was seen to be covered by the enamel organ: the addition of a drop of dilute hydrochloric acid (one part of acid to eleven of water) a

once produced the appearance described and figured by Mr. Huxley; that is, a membrane seemed by degrees to swell up from the whole surface of the enamel, the outer surface having adherent to it, by their proximal ends, the columns of the enamel organ. The covering glass was then removed, the acid taken up with blotting paper, and dilute spirits of wine substituted. The next step in the investigation was the removal of the membrane raised by the acid, in order to submit it to separate examination. This end was effected by the aid of needles; but in the operation the part became torn in several places, so that its sack-like form was lost. On returning the specimen to the microscope it was seen that the membrane had a strong tendency to roll up in an opposite direction to its normal position on the tooth, the outside thereby becoming the inside of the rolls. This disposition offered facilities for examination: had it been otherwise there would have been some difficulty in obtaining a good view of the torn edge—an inspection of which, with the quarter of an inch object-glass, showed the conditions given in fig. 1, Pl. XV. It will be observed, on examining this figure (which is an accurate representation of a preparation which I have succeeded in preserving), that we have on the concave side the columns of the enamel organ, while on the convex side the decalcified enamel fibres remain. I have failed to discover anything like a distinct membrane interposed between the two parts. A point may be recognised where the two graduate into each other; but this part cannot be regarded as a membrane, as the forming-enamel fibres clearly pass through it.

The columns of the enamel organ are, however, very readily detached, and many float off in the fluid when the part is under manipulation. If examined in this condition, some are found in parallel bundles, and apparently attached slightly to each other; but many are quite unconnected (fig. 2). But whether associated or single, each column will be found to have a delicate small process projecting from that extremity which was connected with the enamel, a process which would pass through a membrana preformativa could such be shown to exist. Immediately above the point from which the process starts, the column has, when separated from its fellows, a slight circumferential dilatation, as

though the cylinder had been everted at the edge when the separation was effected. A close examination of the columns will, I think, lead to the belief that each is composed of a delicate sheath, in which is enclosed one or more nuclei, the interspaces being occupied by transparent granular matter. The nuclei are usually more distinct near the peripheral end of the columns; the attached extremity being commonly more granular than nucleated; but I have seen cases in which the sheath seemed pretty fully occupied by nuclei. After the preparation had been kept for a few weeks, the nuclei became more faint, and the granular matter more apparent.

Now, supposing the decalsified enamel fibres are detached from the columns and are viewed singly, it will be seen that the end which approached the dentine is clear and transparent, while that which meets the columns is coarse and granular, appearing by transmitted light of a deep brown color; indeed, but for the color, it would be difficult to distinguish the distal extremity of the decalcified enamel fibre from the proximal end of the column of the enamel organ, fig. 3.

In many parts of the specimen the columns have been wholly detached, leaving a surface similar to that figured by Mr. Huxley, and described as the membrana preformativa. But if we look directly at the edge of the specimen where it is turned towards the observer, it will be seen that the enamel fibres pass through to the surface of this apparent membrane, fig. 4, *a*.

The enamel fibre, in its decalcified state, consists of a fine transparent and structureless sheath in the part which is fully formed, but in the distal portions, where development is progressing, the sheath appears to contain in many instances granular matter, fig. 3.

M. Lent mentions that he had at first some difficulty in obtaining the membrana preformativa, freed from enamel fibres. He at length succeeded, by treating the decalcified specimens with caustic potash or soda. No doubt the extremely delicate sheath of the enamel fibre would under such treatment soon disappear, and he might have got rid of the so-called membrane by a continued application of the same agent, in which case he might as fairly have argued that no soft tissue existed, as he has done in

assuming that a distinct membrane bounds the enamel fibres because the sheaths have been dissolved by an alkali, before the partly-ossified distal extremities disappeared.*

The appearances which I have described, as existing in one specimen, may be found in the teeth of similar age in any fœtus, which has not been too long kept. Immersion in spirits of wine for a short time, I think, favors the demonstration, as the extremely-delicate columns of the enamel organ become hardened, and hence keep their normal position more frequently, than in perfectly-fresh subjects. Still in the latter similar structural conditions to those I have describded may be observed.

If, instead of taking an incisor, the first molar of a nine-months' fœtus be selected, the tooth-sac will be found distended with a fluid, in which numerous nucleated cells float. Generally the cusps of the pulp are covered by caps of dentine, though this is not uniformly the case at this age. In several instances I have preserved specimens, in which one cusp only was invested with dentine, while the others were quite free from calcification. In the latter case the membrana preformativa should be distinctly visible. I have not been able, however, to see anything that conveys to my mind the idea of a distinct and separable membrane. A slight amount of transparent tissue may be seen extending beyond the peripheral dentinal cells, but it also dips in between them, and has all the appearance of being nothing more than the blastema, which connects into a mass the cells of the pulp. I do not, however, propose to go into the development of dentine in the present article; hence the question of the presence or absence of a

* The results of the following experiment illustrate the amount of dependence which can be placed upon membranes, the existence of which cannot be demonstrated otherwise than by the use of reagents. A thin longitudinal section was prepared from the upper incisor of a rat. This was placed for a short time in hydrochloric acid and water (one part of acid to eleven parts of water); on removal, the acid was neutralized by a solution of potash. When placed in the field of the microscope, it was seen that membranes had started up from the whole surface of the preparation. Not only did a membrane part from the surface of the enamel, but one equally distinct peeled up from the worn, masticating surface of the tooth, while others appeared upon the surfaces which were produced in grinding the section. The membranes thus demonstrated were distinct, clear, and transparent, but exhibited no trace of the structural characters of the tissues from which they were derived, and of which they had formed a part prior to the application of the reagents. In this experiment, the action of the acid was arrested by the potash before the whole of the section had been decalcified. The edges and surfaces were softened, but the interior remained firm and retained its structural characters.

preformative membrane extending over the dentinal pulp, and the relations of such membrane to the development of dentine, may be left for future discussion.

If attention be directed to the cusps in which calcification has commenced, appearances similar to those described in the incisor will, if similarly treated, be found, excepting only the enamel organ, the columns of which, in this case, are shorter than those in the more advanced tooth.

Although I have confined the description to the structural conditions found in developing teeth in one jaw, my examinations have been extended over the teeth from many fœtal jaws. The results have, however, been uniformly similar.

Assuming that the foregoing observations have been correctly made, we need have no difficulty in explaining the manner in which the enamel is developed, and in accounting for the appearances exhibited in the fully-formed tissue; of which a description and figures were given in the last Number of this Journal. The columns of the enamel organ must be regarded as subservient to the development of the fibres, the conversion of the one into the other taking place in the following manner:—The proximal end of the column becomes calcified, not uniformly throughout its thickness, but the outer surface or sheath first receives the salts of lime, and at the same time the columns become united laterally. At this point—that is, at the extreme margin of calcification—the columns readily separate from the fibres, and leave a surface which, when looked upon directly, has the appearance of a membrane, the reticulate character of which (figs. 4 and 5) is due to the withdrawal of the central portion of the calcifying column, this central portion being the process which has been described as forming part of the detached column (fig. 2). The calcification of the central part of the column goes on gradually, but does not keep pace with that of the sheath, and when calcified, presents some points of difference when compared with the surface of fibre. Thus, in adult tissue, the interior of the fibre dissolved before the surface, leaving the reticulated appearance described and figured in the last Number of the Journal. Before calcification, the nuclei of the column appear to break up into

subgranular matter, which may often be detected at the distal ends of the forming-enamel fibres (fig. 3). The situation usually occupied by well-marked oval nuclei is the distal extremities of the enamel-organ columns; but sometimes we find examples in which the nuclei, or bodies very like them, fill up the whole of the sheath, and become calcified: fig. 6 illustrates this condition. It may generally be found in the opaque white or brown teeth frequently seen in strumous subjects. A little practice will enable the histologist to recognize teeth which will yield specimens like the one figured.

Many authors have noticed the transverse striation of the enamel fibres. The structural condition I have described is but a more-perfect development of that which is but faintly marked in the striation, and a less-perfect development of the enamel itself.

In looking over a series of sections of teeth, we shall not fail to find other exceptional conditions than that I have described, and these must be also regarded as the results of imperfect development. I allude to the irregularly-granular state of the enamel fibres found in patches scattered here and there amongst highly-developed tissue. At such points the granularity is in many specimens confined to the interior of the fibre, the sheath appearing clear and structureless. Indeed, this deviation from the normal state appears due to the calcification of the columns of the enamel organ, prior to that change by which the granularity disappears, and the fibre becomes transparent.

Mr. Huxley has referred to the "persistent capsule" described by Mr. Nasmyth, and considers it to be identical with the *membrana preformativa*. In several specimens which have been decalcified, after being reduced sufficiently thin for microscopic examination, this membrane is obviously continuous with the cementum of the fang, and in other specimens, which have not been treated with acid, I find the membrane thickened in the deep depression of the crown of molar teeth, and there tenanted by a distinct lacuna. The occurrence of these two circumstances would indicate that Nasmyth's membrane is cementum, rather than membrana preformativa. The general absence of lacuna in this membrane is due to its want of sufficient thickness to contain

them, just as we find these bodies wanting in the cementum of the fang when the layer of that tissue is very thin.

Apart, however, from this apparently-structureless layer described by Mr. Nasmyth, we may sometimes observe a diminution in the fibrous character of the enamel at the terminations of the fibres on the surface of the tooth, and also at the terminal edge of the enamel on the neck of the tooth. In each of these situations appearances may be found which suggest the idea that a fluid blastema became calcified, and that the fibres had in the process become fused, and more or less lost in the mass so formed. Indeed, in the situation last mentioned, lamination of an indistinct character may take the place of fibres; or both the laminated and fibrous arrangement may be replaced by a structure exhibiting little arrangement of parts. In any case, however, this deviation from the normal structural character of enamel is limited to the terminal edge of the tissue. The development of dentine and cement will form the subject of a future communication.

CORRESPONDENCE.

FOR THE DENTAL RECORDER.

DR. BALLARD:

Dear Sir—In the July number of the Dental Recorder, I noticed an article under the head of *Mutilations by India Rubber Ligatures.* Will you permit me to state the facts in this case, so far as they came under my notice.

Mr. M———, a highly respectable merchant of this city, called upon me during the early part of the past winter, with his son, a lad aged about 12 years. The father requested that I should regulate, or bring out in a line with the other teeth, a lateral incisor on the left hand side of the jaw of his son. I took an impression with wax, and got up a plate in the usual way. I constructed and so adapted the plate, that gentle pressure from the front under teeth should be brought to bear against a gold strap attached to the plate and extending and touching the lingual surface of the lateral incisor, which I designed to bring out in a line with the central and lateral on the other side of the jaw. After this plate had been worn for several weeks, I succeeded in so far overcoming the irregularity that the under teeth closed inside of the lat-

eral incisor. I then attached an india rubber strap so that the tendency would be to retain or hold the tooth in the position where it had been brought, by the use of the gold plate. The lad was directed to call every morning, on his way to school, fearing that the pressure might be too great, if left on for more than twenty-four hours at a time. The boy called, as directed, and in about ten days the father and the son both called, and we were satisfied that no further professional duties were required; the father paid the bill and the case was discharged. From and after this time, my services were ended, and the case went into other hands, and all I had to do in the matter was to give my advice, which does not seem to have been observed, or carried out. I would here state, that not the least soreness or irritation existed at the time the case was discharged. It was considered judicious, however, to wear the straps occasionally, fearing that the advent of the eye-tooth might tend to force the lateral incisor out of its place. The boy did not make any engagement to call again, and the father was to put on or leave off the strap, as circumstances would seem to indicate.

At the end of about ten days, the father called with his son, and, on an examination, I found the lateral incisor quite loose, while the central was as firm as ever. Mr. M. stated that his son had had an attack of the mumps, and that during the son's illness, the india rubber strap had disappeared. I at once made a very careful and thorough examination, but could not discover the least trace of the elastic strap, and I was well convinced that if the strap had inclined upward, it was entirely beyond the art of any one to remove. It was but reasonable to suppose, as we had great difficulty in making the strap stay upon the tooth, that it had dropped off. Another matter was to be considered, the boy was just recovering from attack of mumps, and considerable inflammation existed in all the gums, yet as the lateral incisor was so loose, and as the eye-tooth was about to protrude from the gum, and fall almost directly into the space which would be left on removing the lateral, my advice was, that this lateral should at once be extracted; and if this had been done, the space would have been entirely filled; but the father said he would wait a few days, and perhaps the inflammation might subside. He then took his son to another dentist, who applied leeches to the gum. The father and son, two or three days after, called again, and to my surprise, both the central and lateral were so loose, that I think I could have removed them with my fingers. I advised that, under the circumstances, it might be proper to remove both of the teeth, and this opinion was given by another dentist, and the family physician. I told the father that I did not know what was the cause of the looseness, (as I could not find the india

rubber band,) unless it was a cold the boy had taken, the irritation arising from the cutting of the eye-tooth, a tendency to scrofula, dental perisostitis, or similar maladies, which often result in loosening the teeth, "but," said I, "from *whatever cause* it may arise, I would advise that both teeth be extracted." The father said he would take further advice on the subject, and I recommended him to call on Dr. P———, which he did the very day I gave my opinion; he did not succeed in finding the india rubber strap, but he took counsel of other dentists, and treated the case with due care and consideration.

I will conclude by giving my own opinion on the subject, but as I did not treat the case, I may not be as capable of forming an opinion as the persons who did treat the case; yet may it not have been possible for this elastic strap to have broken at the time it disappeared, and as it had probably become fastened above the bulb of the yet enveloped eye-tooth and the lateral incisor, hence, when it broke, the stretched strap would so contract, that the ends could not be discovered. Such a condition would also seem to account for the inflammation commencing between the eye-tooth and lateral incisor, and the impossibility of finding the strap; and I am still further convinced in this belief, from having recently examined the case, in the presence of all of Mr. M.'s family, whose statements were freely given in reference to all of the attending circumstances. H. B.

Mr. Editor,

Allow me to say, through your journal, what I intended and ought to have said before the convention, recently held in New York, respecting the best method of preparing gold for filling teeth. There are two modes, in my opinion, equally important, viz:—"Sponge or Crystal Gold," and "Gold Foil."

Let us first consider the properties of Crystal Gold. Living in Utica, where this article (prepared by A. J. Watts & Co.,) first made its appearance, I had an early opportunity of experimenting with it, with, at first, very unfavorable results. I however continued to make trials with it, but with little or no better success until within the last three months, when all at once they produced altogether a new and much improved article, which has a lively metallic appearance; the crystals are large and distinct, holding to each other with great tenacity, requiring considerable force to separate them for use, grasping each other like old friends long separated when accidentally or otherwise brought in contact. There is little or no waste in its use, nor the least difficulty in welding it, particularly when it is kept free from moisture, and I

most cheerfully recommend it to the profession, hoping that every member of the same will at least make a trial of it, believing that when they have once done so, they will not feel at home without it, providing they are supplied with proper instruments for its use.

Having said thus much about Crystal Gold, allow me to direct your attention to the use of Gold Foil; with respect to this article, I think I may without vanity claim to be something of a judge, having practiced in the profession, constantly using it for over thirty years.

When I commenced filling teeth, such a thing as welding was never thought of, at least such a thing never entered my head; the foil I then used being made of gold refined in the crucible, and not by any other chemical process.

Since that time the material has been vastly improved, but constantly varying in quality until about two years ago, (when the Crystal Gold was first brought into notice, which as I before stated I commenced to use with little or no success,) and such being the case, I was determined if possible to obtain a foil which was chemically pure. I succeeded in obtaining such an article of A. J. Watts & Co., and was delighted with the results.

I felt that it was a new era in the matter of foil, but in the height of my exultation I was doomed to disappointment, for I supposed that they would furnish me in future with all the gold I wanted, but they refused to refine any more for me for reasons best known to themselves, and I have not been able to procure anything like it since, although I have tried the produce of a number of gold refiners. From time to time I have endeavored to get them (A. J. W. & Co.) to refine gold for foil, and for nearly two years have been urging them to manufacture for the market a foil of the character I had obtained from their gold, but in vain, until quite recently when they consented to do so; and I am happy to state to the profession that we shall soon have what they are pleased to term "A. J. Watts & Co.'s Crystal Gold Foil," an article which we can rely upon, as it will be uniform in its quality, and will contain the cohesive or welding property so loudly called for by Prof. Arthur and other leading members of our profession. If we can obtain such an article, what cannot we do? when fillings have been known to stand the test of over thirty years, made of foil refined only in the crucible (a case of which was brought before the convention recently held in New York).

A. BLAKESLEY.

UTICA, *September* 20, 1856.

EDITORIAL.

In our last issue we published a condensed but imperfect report of the proceedings of the American Dental Convention, held in this City, last August, promising our readers the benefit of the Official Report, when that much desired document should appear. It has at last made its appearance, but considering it no more a perfect report of the proceedings than the one which we published in September, we hardly think our readers would prefer it to the exclusion of other matter. The Official Report has been published in the Forcep and also in the Obturator, the Editors of both of these journals expressing quite freely their sentiments of disapprobation. We have read the report carefully, and confess that in its pages ample justice has been done to the Chairman of the Committee of publication. At first sight this may seem a little odd, but upon reflection, we think a great deal of allowance must be made for the difficulties thrown in the way of the strict and thorough accomplishment of such a duty. There were nearly two hundred members present at the Convention. The transactions and discussions occupied the best part of three days. The narrative of these proceedings, as taken down by the reporter, was probably nothing more than an attempt to convey the sense or *non* sense of each person's remarks. The *reviewer* of such a report could not possibly remember all that was said, and even to remember word for word what he might have said himself, evidences a very uncommon memory. It became his duty to make the report as full, complete and accurate as his ability would permit. If he could not remember what others said, then the reporter's memoranda constituted the only authority. If he could remember all that he himself said, (which of course became convention property,) it became simply a question between delicacy or duty; delicacy in the matter of reporting himself in full, when the remarks of others had been condemned or omitted; duty in the matter of making the report full so far as his own memory could be relied upon. We are disposed to find fault with the *Reporter* rather than any member of the committee. The miserable appearance the proceedings of the convention make in book form, will probably have a good effect upon future conventions, but it renders this one ridiculously immortal.

The experience of the past must convince any one that a free and open convention is not the place wherein to discuss scientific subjects, but that it is just the place where really practical questions can be discussed to the best advantage, where the greatest number of practical facts can be brought out, and where they can be distributed to the best advantage. We hope the committee upon whom devolves the duty of naming subjects for discussion will bear this in mind. There is no question but that there should be some national association, where scientific professional subjects can be discussed; such an association should properly spring from the profession in convention; in that case, no matter how select it might be, its origin would be democratic. But to return to *the report*. The only part of it which can by any possibility be gotten into shape, or which would prove of either interest or utility, is the portion relating to the Gold question. This we shall endeavor to get into shape, and if it can be done, our readers shall have the benefit of it.

PHILADELPHIA COLLEGE OF DENTAL SURGERY.

We regret to notice in the Forcep a comparison instituted between the number and class of infirmary operations performed at the Philadelphia and Baltimore Colleges, which would at first glance seem, and we fear was intended to be unfavorable to the former. Nothing would prove more unfortunate or disastrous to the cause of Dental education than a spirit of rivalry, competition or opposition between any of the different colleges; and nothing would be more terrible in its consequences to our profession, than a blow at Dental Collegiate education. We are just now, as a body, feeling its good effects, and a spirit of good will, amity and friendship between the different Colleges, will greatly enhance these good effects; such a state of fraternity will not be brought about, or if it exists, (which we believe to be the case,) will not be cemented by instituting comparisons unfavorable to any. We wish success to all Dental Colleges that are conducted with a view to the ultimate *professional good*, and we believe the three now in existence are so conducted.

New-York Dental Recorder;

DEVOTED TO THE THEORY AND PRACTICE OF

Surgical, Medical and Mechanical Dentistry.

Vol. X.] OCTOBER, 1856. [No. 10.

UTICA, *November 6th*, 1856.

DR. BALLARD,

Dear Sir:

Since writing the article, published in the September number of your Journal, (in which I gave promise of a new article of Gold Foil, by A. J. Watts & Co.,) they have fairly commenced, and are now producing a beautiful foil of chemically pure gold, and are prepared to supply the profession with the same.

I have been using specimens of this gold for the last two months, and all my most sanguine hopes and expectations are realized with respect to its cohesive or welding property, together with its uniformity in texture and quality, in which very important particulars it by far surpasses any foil I have ever before found in market.

Nor does its cohesive property seem to be impaired by exposure to the atmosphere of the room, as I frequently operate with particles prepared for use, after having laid by for a day or two, without its requiring any annealing, with as good success as though it were just prepared; I would, however, recommend annealing as a general thing, (I mean for remnants,) to free the gold from any moisture or dirt that may accidentally have been deposited on its surface; but it is totally unnecessary to do so preparatory to using fresh pieces.

My mode of using it is chiefly in the form of pellets, made by cutting a sheet of No. 4 into two or more parts, (as circumstances and good common sense will dictate,) depending upon the size of the pellets required, making the same into the form of a rope, by *lightly* rolling it between the thumb and forefinger, cut-

ting it into all sizes, using the larger pellets for a foundation and the smaller ones as I approach the external surface of the filling.

The instruments I use (with the exception of those made in my own office,) are those furnished by Sutton & Raynor, under the inspection of Dr. C. W. Ballard, for the use of Crystal Gold, an article which I would on no account be without, as I would not be doing justice to my patrons without it, knowing that such an article was in the market as the beautiful preparation I have been using for the last three or four months; I use it almost as frequently and with as good success as Gold Foil, alternating one with the other, sometimes combining them, laying a foundation of Foil and finishing out with Crystal Gold. I think that between the two, we have at last got what we have so long needed to make a perfect and durable filling. Trying will reveal the naked truth; so try for yourselves.

A. BLAKESLEY.

VULCANIZED RUBBER AS A BASE FOR ARTIFICIAL TEETH.

Editor of the Dental Recorder:

According to your request, I give as follows my experience in the use of *Vulcanized Rubber* as a base for Artificial Teeth:

In February last Mr. Goodyear applied to me, requesting that I should conduct a series of experiments to test its utility for dental purposes, if possible.

He gave me the assistance of Mr. F. A. Bevins, one of his experimenters in Vulcanized Rubber, and to him am I much indebted for my knowledge of the material and its peculiar properties. Since May last I have been constantly using it, and have now in use eight full sets, fifteen half sets, and several partial, from one tooth to ten, and so far as I know, all are giving entire satisfaction.

I am at present prepared to claim for it, without any fear of a controversy, the following advantages, viz: *a perfect fit in every instance*, entire cleanliness without taste or smell. No galvanic action as in gold and silver, easy to make, and less liable to break in use or by a fall than any other style. Judging from exper-

ience and the opinions of others who have witnessed my experiments, it will outlast everything that has gone before it.

With all its advantages, however, I now offer $1000 to any one who will impart, and secure to me, a method of obtaining for it a color to imitate the natural gums. Its present color is similar to mahogany, and is equally susceptible of as high a finish, which it retains as long as worn.

Teeth manufacturers are now making single plain teeth without pins, gum teeth with grooves, and moulded blocks, which are admirably adapted for this work.

I find no difficulty in inserting temporary sets immediately after extraction.

Teeth made for this purpose do not require the rubber to come outside.

The top or gum part of the tooth is allowed to rest upon the natural gum, a desideratum, I believe, which has never been accomplished in the use of gutta percha.

For the benefit of those desiring to test the work, I give the following

DIRECTIONS:

Plaster moulds are made and the teeth arranged the same as for making a tin base, using gutta percha for the plate.

First make a plaster model from the impression, one and a half inch thick, and four inches in diameter, allowing three fourths of an inch flange outside the alveolar ridge; then fit a gutta percha plate and arrange the teeth or blocks according to the articulation, after which mould wax inside and outside of the teeth as desired for the rubber; (should a vacuum be desired cut it from the impression before pouring the model.) Then pour a plaster mould covering the teeth, plate and wax, and of equal size and thickness as the model. When parted remove the wax and plate, the teeth remaining in the last mould. This is now to be filled with rubber, observing that no air is left between the strips as laid in. The model of the mouth is then compressed upon the rubber and mould, and fastened with twine, to remain until vulcanized.

To vulcanize, a boiler of about two horse power, and capable of sustaining sixty lbs. to the square inch, is required. To this,

is attached a steam chest of equal strength, and about the size of an ordinary barrel, in which the bulb of a thermometer is placed to govern the degrees of heat required.

The work to be vulcanized is then covered in a box of pulverized soap stone, and placed in the heater, or steam chest. The steam is let on until the mercury rises to 240, allowing it afterwards to rise 10 degrees every 30 minutes for 3½ hours. The mercury is now raised to 305, where it stands 1½ hour, and the work is vulcanized. The cost of this apparatus and fitting up is 175 to $200, but as twenty sets or more can be vulcanized at the same time *one* can be, it will no doubt be an inducement for some one in each convenient locality to make arrangements to fill sets with rubber, and do vulcanizing as a business of itself. Having no time at present to give personal attentiou to work for others, my heater is at the service of those who wish to vulcanize, by applying to my assistant, Mr. Cobb.

It would be gratifying to many, who have become interested in this work, and to myself also, to receive suggestions by letter or otherwise, with a view to its more perfect adaptation to dental purposes, and thus by a combination, bring out at once what its most sanguine supporters desire and believe can be done.

The use of rubber for this, as well as for other purposes, is covered by patent by Mr. Goodyear, who is now in Europe; and at present I am unable to say what terms he will make with those desiring to adopt its use. In the mean time, however, I take the responsibility of allowing test sets made for all who do or do not wish to compete for the $1000.

Respectfully, &c.,

C. S. PUTNAM,

New York, *November 1st*, 1856. 35 Bond-Street, N. Y.

DESTROYING A NERVE WITHOUT PAIN.

Mr. Editor,

Having never since noticed the following method of destroying the nerves to front roots, when it is designed to insert a pivot tooth, I am induced to make it public through the Dental Recorder. It is not original with me—cannot remember now

to whom I am indebted for it—have practiced it two years or more—have made it known to many dentists who I know also practice it with entire success. After the crown has been removed, mix up on a piece of glass or tin, a little *whiting* and *creosote* to the consistency of cream. Then take a hickory stick whittled to about half the size of the nerve cavity—take on the end of the stick a little of the mixture, (about the size of a small pin head,) introduce it between the nerve and the walls of the cavity, only slightly touching the parts—hold it there for a few seconds, then press it up as rapidly as can be done without pain, until the nerve is destroyed. It may be necessary to dip the stick into the mixture some two or three times. If all this be done with care, the object will be attained without pain. I have never occupied more than four minutes in the operation, and have never failed to attain the desired end.

D. C. Estes.

Albany, October, 1856.

ON THE EMPLOYMENT OF CONGELATION IN OPERATIONS ON THE MOUTH.

Editor of the London Medical Times and Gazette.

Sir,—Mr. Field, in his report of a successful case of staphyloraphy, in the last Number of your Journal, makes the following observation:—

"I tried, with the assistance of some medical friends, to produce congelation of the palate by means of salt and pounded ice; but in this we totally failed, even after more than an hour's perseverance. Our failure is to be accounted for, I suppose, by the high temperature of the parts and the current of warm air through the mouth and nose, to both of which the freezing mixture would be exposed."

From this it might be inferred that congelation is ineffectual for operations about the cavity of the mouth,—an inference which my daily practice shows to be erroneous. No surface of the human body, with which extreme cold can be brought in contact can, so far as I can conceive, resist its benumbing effects, even for a few minutes, provided it be efficiently conducted; and,

though there may be greater difficulties to surmount in applying cold to the mouth than to other surfaces of the body, yet its tissues will as certainly succumb to its anæsthetic influence as other parts.

To succeed in producing an efficient anæsthetic effect, the form and degree in which the cold is employed must be adapted to the part to be operated upon. That form, for example, which would be eminently successful for an operation on the external surface of the body, might be, and is, most inappropriate for operations in a cavity like the mouth. The failure, in the above instance, was unquestionably the result of a defective method of applying the cold. It is obvious that only a very small quantity of pounded ice and salt, or of any other freezing mixture, could be placed within the mouth,—a quantity far too small to remain at the low degree of temperature necessary to produce insensibility of the tissue. Moreover, in applying solid ice and salt to the upper surface of the mouth, the coldest portion would necessarily gravitate, leaving only ice to be thawed by the warm palate.

Considerable experience in the application of cold in operations on the mouth, has shown me that, First the cold should be applied in a fluid or semi-fluid form, accompanied with pressure. By this means it can be applied equally to every portion of the required surface. Secondly, such cold fluid should be subject to repeated or uninterrupted change; otherwise the heat absorbed from the mouth would raise its temperature, and thus counteract the anæsthetic effect. Thirdly, the fluid should be of sufficiently low temperature to produce an anæsthetic result, adequate to the nature and severity of the operation. Fourthly, it should be enclosed in a very fine preparation of india-rubber, or thin membrane, which, without interferring with its efficacy, would prevent the ingredients escaping and irritating the mouth. The employment of india-rubber, at my suggestion, has been found most serviceable in the application of cold generally, especially when the surface is abraded, and in cases of cancer, etc.

There are several ways in which an unalterably low temperature may be continuously applied to the mouth. A body of water, cooled down by ice and salt to zero, or by the addition of nitrate of ammonia and other salts to almost any degree below

zero, may be passed in a continuous current over the part, through a delicate membrane moulding itself by the pressure of the fluid to the form of the surface. A current of cold, either direct or graduated, is not, however, indispensable to operations on the mouth, as has been supposed.

The desired anæsthetic effect may be gained by enclosing a cold and easily soluble freezing mixture in a vessel having a tube, the terminal portion of which may be adapted extempore to the nature of any case; the exposed portion being covered with thin india-rubber or membrane and applied to the part. It is only necessary to subject the contained fluid to occasional change and admixture to maintain or produce any degree of cold that may be desirable. I have contrived a small apparatus of the latter kind, the more minute description of which I reserve for a future opportunity, when I can illustrate it by a diagram. By a few minutes' application of either of these processes a perfectly successful anæthesia may be obtained. The current process having been made the subject of a patent is unfortunately unavailable to the Medical Profession generally.

I have not had an opportunity of employing congelation in a case of staphyloraphy, but I have frequently had occasion to freeze large portions of the palate, and I have always accomplished it with the greatest ease. And the success I have met with in removing teeth, exfoliations, etc., of which Dr. Arnott, Dr. Druitt, and others have been witnesses, places the possibility of successfully employing a properly-managed congelation in operations on the mouth beyond a doubt.

I am, &c. J. R. QUINTON.

18 *Orchard-street, Portman-square, August* 25, 1856.

ADMINISTRATION OF CHLOROFORM.

Editor of the London Medical Times and Gazette.

SIR,—I consider that the time over which the inhalation extended in Mr. Witten's case of administration of chloroform explains the want of success, when we take into account the circumstance, that with the form of inhaler which he used only a part of the chloroform is taken into the lungs, and that a great

portion is blown away by the warm breath during expiration. Mr. Witten would probably say that he has succeeded in other cases when using the same inhaler, apparently in the same manner. But the effect produced depends entirely on the proportion of chloroform vapour in the air breathed by the patient, and this varies, in using such an inhaler, with a number of circumstances which may easily pass unobserved; as, the accuracy with which the inhaler fits the face, the temperature of the sponge, and the amount of air which passes through it before being breathed. I have not found that the nervous temperament has rendered patients less susceptible to the influence of chloroform, and, as regards the deterioration of the blood, no amount of it which is consistent with life could affect the absorption of the vapour in the lungs, which is a strictly physical process.

With respect to my statement, that twelve minims of chloroform, when present in the blood, cause unconsciousness, I am able to adduce not only a calculation, but a direct experiment, in proof of it. The calculation is founded on some experiments which I published in the *Medical Gazette* for 1848, Vol. I. I found, that when animals were made to breathe air containing as much vapour of chloroform as would enable the blood to take up one fifty-sixth part, as much as it is capable of absorbing, it produced what I call the second degree of narcotism; a state in which the animals were incapable of perceiving what was occurring around them. Now, the serum of the blood like other watery fluids, is only capable of dissolving about one part in 288 of its volume of chloroform; and if this number be multiplied by 56, and the quantity of serum in the body, (which, according to the experiment of Valentin, averages 410 fluid ounces,) be divided by the product, the result is 12 minims. The direct experiment is as follows:—If 12 minims of chloroform be put into a good-sized bladder, with 400 or 500 cubic inches of air, and an adult person breathes it backwards and forwards, as he would breathe laughing gas, he becomes quite unconscious in less than a minute; not sufficiently insensible for a surgical operation—for that would require about 18 minims—but he becomes altogether oblivious of everything about him. It is not necessary or desirable to exhaust the lungs before performing this experi-

ment. The 12 minims of chloroform are undoubtedly diffused through the blood of the whole body. When animals are killed with chloroform I can detect it by chemical analysis as easily in the muscles as in the brain, and I found it readily in the leg of a hog, which was amputated while he was under the influence of the vapour. The quantity of chloroform in the brain at any time is much less than a single minim, but this need not surprise us when we know in what small quantities the alkaloids produce their effects. Chloroform appears to produce its effects without undergoing any change itself; for, after a person has inhaled it, the vapour may be detected by chemical tests coming off unchanged in the breath; it can be detected in the bodies of animals killed by it, for a fortnight after death; and, lastly, by breathing it, mixed with oxygen, from a bladder, and making an arrangement to absorb the carbonic acid produced, the effect of a small quantity may be kept up for an indefinite period, and a few minims can be made to do the work of several drachms.

I am, &c. JOHN SNOW, M. D.

18, *Sackville-street, June.*

UNITED STATES CIRCUIT COURT—Nov. 14—Before Judge NELSON.

Warner *agt.* Griffin.

This is an action for an infringement of what is known as Allen's Patent for setting mineral teeth, by means of an artificial silicious compound resembling the natural gum.

The trial commenced on Monday last, and has occupied all the time since. A large number of dentists and chemists have been sworn.

The principal defense is that the invention is not new, as it was practiced by Dr. De Labarre in Paris, Dr. Dodge in this city, Dr. Hunter in Cincinnati, and others.

The whole range of dental art has been inquired into. Among other specimens produced were the teeth used by the celebrated Aaron Burr. These teeth were manufactured in Paris, and set in the mouth of Colonel Burr. On his death he gave them to Dr. Graham of this city. They are single teeth, set upon a platina plate, fastened to the plate by rivets, and an artificial gum made of some kind of porcelain.

The defense also insisted that the patent was void, because too vague and uncertain. VERDICT FOR DEFENDANT. For plaintiff, D. P. Barnard. For defendant, G. Dean.—*New York Tribune.*

EDITORIAL.

CORRESPONDENTS, SUBSCRIBERS, EXCHANGES, &c., are requested to direct all Communications relative to the financial or business departments of this Journal, to "SUTTON & RAYNOR, 609 Broadway, N. Y.;" and articles for publication, books for review, exchanges, reports of society meetings, and all correspondence, belonging to the editorial department, to "EDITOR OF DENTAL RECORDER, 139 Fourth-Avenue, N. Y."

Below our readers will find a report of the discussion on the best form of gold for filling teeth. The report is now published in fulfillment of the promise made in last month's Recorder, "to furnish a *corrected* report of the discussions" upon that subject. Our authority for the corrections is genuine, coming not from the Convention, or its Publishing Committee, but from the Speakers themselves. The fulfillment of our promise involved a greater amount of labor than we expected, or than would seem possible at the first glance; nevertheless, we do not regret it, as we are thereby enabled to present some record of the Convention worthy the name.

BEST FORM OF GOLD FOR FILLING TEETH.

Dr. DWINELLE said that gold foil had accomplished more for dentistry than any other auxiliary. But all things considered, he was now convinced that the best preparation was pure gold in a crystalline condition, and he founded his declaration on some little experience. While in Europe a few years ago, he had tried several preparations of sponge gold; but that was in an amorphous or unorganized state, and impracticable for filling, while this crystalline gold was highly organized. Soon after returning to this country, he fell in with Dr. Watts, of Utica, who was pursuing a course of experiments in producing the article that he had now perfected, and was all that any one could desire. He (Dr. D.) had acted in concert with Dr. Watts, who had spent thousands of dollars in experiments, supported by his devotion to the interests of the profession, and his honest conviction of the superiority of the article. It was superior to foil in some instances, because it was a more plastic article, more capable of being modeled and built up into desired forms. It could be worked with great facility, and made absolutely solid. This was no mere theory for he had demonstrated it. He had made fillings of crystalline gold, and after they had been worn in the mouth eighteen months he had taken them out, sent the gold to an analytical chemist to ascertain their specific gravity, and found it equal to that of molten gold. None of his crystalline fillings had disentegrated or absorbed the fluids of the mouth; they were as good and as solid as the day they were first put in, and he expected them to stand fifty years hence, if the patient should live so long. He claimed to do with this article all and more than could be done with foil.

DR. TOWNSEND, of Philadelphia, said he had worked with foil, for the last twenty-five years he believed, like Dr. Dwinelle. He believed a great many operations could be as well performed with gold foil as with crystalline gold. His friend said that a tooth could be built up into almost any desired shape with crystal gold; so

it could with gold foil. The Vice President (Dr. Neall,) had, at this moment, two fillings in his inferior molar teeth which he (Dr. T.) inserted ten or eleven years ago, built up so as to antagonize with his upper ones. He built up the gold, one piece on top of another, welding it on until it was higher than he wanted it. One of these teeth had been in constant use for mastication ever since, and there they both were standing up like two cones. And this was no remarkable case. A year and a half ago he had, with gold foil, built up the crowns of two teeth with no wall around them, and they had been used for mastication ever since.

And now for his experience in the use of crystal gold. Three years ago he was induced to try it as something with which he could do unheard of things. He experimented several days on it with his fingers to get at the method of manipulating. In the first difficult case he had after that, he used the article, and was perfectly delighted with his success. He went on using it several months, when his patients began to come back. He noted all their cases in a book, and he found the edges of the filling breaking away and disentegration going on. Sometimes the gold had entirely disappeared, and in others he had to take it out. And to make the story short, the two ounces that he had used, to his best knowledge and belief, was all taken out, at least he hoped so, for he felt it his duty as an honest man to refill them with gold foil.

After that a better article, so called, was offered, and he made some experiments with that with a great deal of care thinking that the defect in his previous work was owing to his bad manipulation. He spent two hours and a half, where he usually spent one on a foil filling. Some of these, so far as he could judge, seemed to have been successful, but his past failures made him afraid of them, and so he took them out. Some were perfect on the outside, but he found caries going on beneath the plug at the margin of the gum. From this want of success he abandoned crystal gold.

Again, on coming to New York, one of his friends who was an ardent admirer of crystal gold, wanted to show him his method of using it. That gentleman accordingly visited him at Philadelphia, bringing with him a newer article, and they spent one whole morning together packing the gold into a tooth which was held in their fingers. His friend pronounced it a perfectly solid filling, equal to molten gold. The next day he took his plugging forceps and with very little pressure pierced it nearly to the bottom of the cavity, and on examining it with the magnifying glass, he found a break around the margin just underneath the crust. Here was a filling put in under the best of circumstances, and packed in with all the force their arms could exert, and it was not solid. After that, he never had the confidence to try the article.

Dr. J. B. Rich said, that as he was the person who packed the filling referred to by Dr. Townsend, it was proper that he should reply at this time to the statements just made, as the case was unfairly stated. In the first place, the filling was not put in the cavity under favorable circumstances; and instead of a whole morning, there was not more than an hour and a half spent upon it, including the talking and explanations, although it was a large cavity in the antagonizing surface of a molar. Dr. Townsend with his fingers only, held the tooth upright upon the arm of his operating chair, so that it was impossible to prevent its having more or less motion. He (Dr. R.) inserted the filling while the tooth was thus held, with instru-

ments that were imperfect, they being mere pieces of wire without handles, which he had taken there to show the points he used, and his mode of packing this kind of gold, but they were not at all suitable to pack the gold hard, they could not be held firm enough in the hand to exert any force with them. And he recollected distinctly stating to Dr. Townsend that that experiment was not intended as an illustration of the degree of density that could be attained, as the tooth could not be held steadily enough for that purpose. As relates to the Dr. piercing the filling with the plugging forceps, that fact does not amount to anything, as there was no attempt made to render it a dense one, the principal object being to show the adhesiveness of this form of gold. The crust that Dr. Townsend speaks of as having pierced through, was produced by burnishing the surface, not by packing. He had stated the circumstance exactly as it occurred and he would leave it to the judgment of even the most prejudiced, to decide if this was a fair experiment. He would insist, moreover, that it was not only unjust, but unbecoming in those who have any pretensions to scientific attainments, to pronounce crystal gold inferior to gold foil, upon the strength of the imperfect experiments they have made with it. If we question those closely who pronounce against crystal gold, we find that they have done so after a few trials, made generally with instruments of a different pattern from those they are accustomed to use, and before they have acquired any skill or practice in the manipulation of this form of gold. And this too, after they have been told over and over again, by those who claim to have used it successfully, that from the peculiar mode of manipulation, it is necessary to follow, in packing it, a considerable amount of education and practice is absolutely necessary before any success can be obtained. No person would pretend to have learned to make good fillings with foil in as short a time as these gentlemen have spent in their experiments with crystal gold. He (Dr. R.) would aver that crystal gold could be packed in the mouth as solid as a piece of gold plate. It had been done again and again. And the margin and every part of the filling can in all cases be made as firm and solid as they can possibly be made when formed of foil, and with a less amount of pressure. And when one has become skilled in its use, there are many cases where it can be packed with much greater facility than foil. By pressure applied with an ordinary filling instrument it had been made to enter into the very substance of the dentine, so that when portions of the bone were broken away from the filling, the gold adhered to it, and upon its being submitted to the microscope, the dentine presented an appearance similar to a piece of quartz, with particles of gold in it; the gold being actually imbedded in the tubuli of the dentine. Now who will pretend to say that a filling put in a cavity in the manner that that was, could be permeated by any fluid. In some of the cavities he had filled, as experiments, he had broken portions of the tooth away from the fillings, and upon examining the surface of the gold so exposed, he had found that it had received as perfect and sharp an impression of the walls of the cavity, as could have been taken by either gutta percha or sulphur. This is more than can be claimed for foil, and shows how utterly impossible it would be, for fluids to penetrate between the filling and the wall of the cavity, when the gold is properly packed.

Many persons, in making experiments with this gold, have used instruments entirely different in shape from those they use in packing foil,—this is one of the causes of their failure. The only change necessary to be made is in the points of

the instruments, which, for crystal gold, require to be dentated, so as to present a surface of sharp points. Another cause of failure, is the attempt to use this gold in difficult cases before having acquired skill in its use. Let those who wish to experiment with it, confine their effort to plain, simple cases, until they have become thoroughly acquainted with its peculiarities, then let them try it in the difficult cases. He (Dr. Rich) had used it exclusively for the last thirteen months, and his good opinion of it increased every day.

Dr. BALLARD inquired of Dr. Townsend, how much crystalline gold he had used in all, in the mouth.

Dr. TOWNSEND said about two ounces.

Dr. BALLARD asked the same question of Dr. Dwinelle.

Dr. DWINELLE had used it exclusively for two years, and nearly so for three years. He could say he had used pounds of it. He had sometimes used an eighth of an ounce a day.

Dr. TOWNSEND said he had not intended in the remarks he made, to object to any gentleman's using the article; in fact, he would be glad to use it himself, if he could produce better results, even if it cost him more time. He was open to conviction, and success would afford him great pleasure.

Dr. BALLARD asked Dr. Rich how much he had used.

DR. RICH replied, some five or six ounces.

Dr. S. A. MAIN, of New York, remarked, that in 1850, he made some crystalline gold for an experiment. He failed to get it perfected, nor had he seen any up to the present day that was perfect. The same trouble that he found then he had found since. He had found two evils to arise from its use: first, while the outer surface of the filling with sponge gold was most beautiful, upon splitting or sawing the filling into two, the inner surface was quite different; and second, he had never been able to pack it so as to make an even joining surface with the sharp edges of the cavity. He wished any one to tell him if he could pack a piece of crystal gold into indentations made with a file, in hard gold; or if he could exhibit an instrument with which it could be packed into every corner of the cavity as they could pack gold foil. He could make crystal gold with nitro muriatic acid, but it was a mistake to suppose that it was pure; if any one had succeeded in making it pure, he would say, bless the man who did it.

Dr. DWINELLE said that Dr. Main's remarks did not apply to crystal gold, as now manufactured, but to another quite different article formed by its being dissolved in muriatic acid and then precipitated, a process discovered by Dr. Jackson, of Boston, who experimented a number of years with it. That had been discarded as worthless, and the article now manufactured by an entirely different process contained 999 and a fraction part of pure gold out of a 1000.

Dr. TOWNSEND remarked that the very article which he first used, and which was afterward condemned, was assayed at the mint in Philadelphia, and found to contain $999\frac{8}{10}$ parts of pure gold out of 1000.

Dr. DWINELLE said it was not condemned for its impurity, but on account of the imperfect manner in which it was manufactured.

Dr. ALLPORT said he had received a letter from Dr. Watts some days ago, in which he authorized him to offer $100 to any dentist who would take his present crystal gold, and put it through a chemical test, and detect the least trace of muriatic acid in it.

Dr. BALLARD had seen the article made from gold coin, and he could assure the Convention, that no mercury or other metal was used in its manufacture, which at present was kept a secret. He only wished he could state more facts concerning it.

Dr. DWINELLE wished to dispose of the muriatic acid, Dr. Ballard having disposed of the mercury. Before the article was completed for the market, it was placed in long cylinders of glass, where it was washed with distilled water until the severest chemical tests indicated that there was not a particle of acid in gallons of the water, when, to make assurances doubly sure, a stream of water was turned on, and allowed to pass through it for twenty-four hours.

On motion, the Convention then adjourned till 9 o'clock tomorrow.

THIRD DAY.—MORNING SESSION.—The Convention met at 9 o'clock.

Dr. TAFT moved to close the discussion on "The best preparation of gold for filling teeth," at twelve o'clock, which was carried.

Dr. DIXON, of Pottsville, remarked that the impression left on his mind by the discussion last evening, was this: That those who had been in the habit for years of using gold foil could make a better filling with it than they could with crystalline gold, while those who had used the crystalline gold to a great extent could make the best fillings with that. He objected to the shifting from one substance to another by the profession at large, in order to arrive at conclusions as to the best preparation for filling teeth. Was it not better to leave the experimenting to those who had turned their attention exclusively to some particular preparation. He must confess that, so far as the use of crystalline gold was concerned, he had a very limited experience. He preferred foil, but thought any dentist could do best by using the preparation to which he was most accustomed. He had seen gold foil fillings which could not be excelled, and instanced one that came under his notice, done by Dr. Townsend. It became necessary to take it out, and he found it as hard as it was possible for a filling to be made of gold in any form. It was difficult to prevent fillings from becoming moist, but a good filling could be made with foil, even if it does become a little damp. He did not think as much could be said of crystal gold.

Dr. W. B. ROBERTS, of New York, said that there were radicals in the dental profession, as well as in politics. He had tried everything for filling, and he had found that in some cases, sponge or crystalline gold could be used where foil could not be used as well, while in other cases foil was best adapted. He practiced on the eclectic principle in this respect.

Dr. C. A. KINGSBURY, of Mt. Holly, N. J., knew of only two preparations of gold for filling teeth, in the form of foil and sponge gold. The question ought more properly to read, which was the best of the two? Both preparations were good. He had been using gold in the form of foil for seventeen years. The crystal gold used at present was very different from the sponge gold first used by the profession. He had seen many cases of operations by dentists who had filled teeth with sponge gold, and he found that a large number of them had proved an entire failure. After being in the teeth a few months, he had found this sponge gold in a very porous and disintegrated state, and he had often found it necessary in these cases, for the preservation of the teeth, to remove the fillings and refill them with gold foil. Most excellent fillings could be made, however, with the crystal gold now used. He had used over an ounce of it making some fillings that gave him satisfaction. He thought

there was a disposition to ascribe too much to one article to the exclusion of the other; it was yet to be decided, he thought, which was the best of the two.

He differed from Dr. Dixon in relation to experimenting. In the language of Liebig, nature speaks to us in a peculiar language; she answers at all times the questions we put to her, and such questions are experiments. An experiment is the expression of a thought; we are near the truth when the phenomena elicited by the experiment are corresponding to it, and when the reverse is the result, we may take it for granted that the question is falsely stated and the conception founded in error. He believed thorough experimenting was the only course to arrive at truth.

Dr. DIXON said that in speaking of experiment, he meant to refer to that flood of experiment with which the profession seemed deluged since the advent of crystal gold. He was glad to see these experiments made in a proper way, and hoped they would be continued.

Dr. T. L. BUCKINGHAM, of Philadelphia, suggested that he would like to hear some one tell how to use crystalline gold. There were annealed gold, cylinders, pellets, ropes, and ribbons, each requiring a peculiar manipulation. They had been told that sponge gold was the very best article, but no one had given them a description of the manner in which to use it. He must confess that he had failed, in most cases, in attempting to use it.

It was said that it could be welded together and made perfectly solid. What was meant by the term solid? It was applied to metals to indicate a peculiar cohesive crystalline structure. It was no evidence because you had the largest amount of matter in a given bulk that the particles were cohesive. Ice occupies a larger space than water, but is much more cohesive? We know nothing about the nature of cohesive attraction except the effects produced. Certain metals in a pure state were capable of being welded without heat. Could they weld particles of gold so as to become perfectly hard and cohesive? Wet clay could be compressed so as to have more material in the same bulk than was contained in a burnt brick, and yet the clay was held together by mechanical adhesion, and the brick by cohesive attraction. This was mere theory, but it deserved attention, for in applying this sponge gold in his own practice, though the fillings appeared to be solid, they had broken down and washed away like clay. Were not the particles therefore held together by the same force as pressed clay? Did it not require vitrefaction or fusion to make the gold solid? The process of annealing was done by means of a high temperature; might not the heat cause a change in the arrangement of the particles by which the attraction of cohesion was increased? Even at a low temperature, gold by rolling was rendered stiff and hard; heated in the fire and it became soft again. His own opinion was that they could not weld crystalline gold by the process of filling. He had seen fillings of this material where the surface was not burnished, absorb repeatedly drops of moisture. He believed he had not been deceived in that experiment. If that was so, would not moisture penetrate the whole lump and break it up? It was possible that it might be held together by the interlocking of the crystalline particles of gold, the same as gold foil when packed into a cavity.

Dr. C. S. WEEKS, of Bedford, N. Y., had used crystalline gold but little. His first attempt three years ago with sponge gold was a total failure. About a year since

he began to use the new crystalline gold, and after several unsuccessful attempts he at last succeeded in some kinds of cavities. He found great difficulty in keeping some cavities dry, but where they were shallow and easily accessible, he could make a better filling than with foil, while with deep cavities not easily got at, he could succeed better with foil.

Dr. AUSTIN, of Baltimore, said that if a crystalline gold filling when subjected to the test was malleable and ductile, it was therefore held together by an equally powerful force with that called cohesion, and it mattered not whether it was actual cohesive attraction or not. If crystal gold could be made as compact as coin it was a new discovery. He regarded the illustration of the burnt brick and compressed clay as scarcely in point. Before going into the fire the elementary substances were in a state very different from what they were on coming out. The silica and alumina formed by chemical action a new compound having stronger cohesive attraction. Reduce that brick to powder, and it becomes far less cohesive than when in its original plastic state; in fact, it was not clay, it was brick dust. If a plug of crystalline gold could be rolled out into a thin plate, and drawn into wire, and having the same specific gravity, it followed that it was as solid as coin. Because metals needed annealing, it did not follow that they were not as solid as before. There was some mysterious agency in heat, but he could not see how a crystal gold plug differed essentially from molten gold, if the specific gravity was the same.

Dr. A. MERITT ASAY, of Philadelphia, gave an account of some experiments made by him, corroborating the remarks of the last speaker, and showing that crystalized gold became solidified in the cavity. He had tested a filling made with sponge gold by the hammer and rollers making it into a very thin plate. This was all done without annealing, proving in his opinion the cohesive or welding properties of crystalline gold. He happened to have that specimen in his pocketbook, which he exhibited to the Convention. He had used probably some six ounces of sponge gold and had yet to see the first discoloration of a tooth. He had used it in cavities where without it he was sure he would have been obliged either to use amalgam or extract the tooth. He intended to use it more freely hereafter. No more difficulty attended the use of it than in the case of gold foil. Great care in either case was required to keep the cavity dry; a wet filling of sponge gold would in time peel off or crumble just as a wet filling of foil would do. Instead of using the sponge gold in little round pieces, he thought it should be applied in flat pieces and packed with an instrument much finer than those made by the manufacturers. He ground his instruments off and serrated them to suit himself.

Dr. WATT, of Ohio, rose to correct the statement of Dr. Buckingham about the impossibility of welding gold except by heat. Gold was one of the welding metals without heat, as every worker in it knew.

Dr. RICH stated that not only gold, but tin and lead, were weldable when cold.

Dr. GEORGE C. WHITE, of New York, said it was but recently that their attention had been called to crystal gold for filling. They knew, on the other hand, that foil had been used from the beginning of dentistry. They had seen what others had done in the use of foil—that fillings had been inserted in the teeth, and had preserved them for generations. On the other hand, fillings had been introduced by other persons, which it had been necessary to renew from year to year, until finally the teeth themselves were destroyed. Two points were necessary to be reached in

filling the teeth: first, thoroughness of operation; and second, skillfulness of manipulation. With these two, any honest man could succeed, either wi foil or crystal gold.

Dr. CLARK, of New Orleans, thought if foil was properly used, and its properties were correctly understood, it would accomplish what every honest dentist would desire to accomplish, the preservation of the teeth. He would undertake to build up a five-cent piece into the shape of a thimble by gold foil of even layers and straight, smooth laminæ, with the pressure of five pounds only, applied with a single point, and any gentleman here could do the same. Still he was much interested in sponge gold, thinking it might be a valuable adjunct to foil. They could do wonderful things with foil, but there seem to be properties in sponge gold not possessed by any other material. He could not say that he could do everything with foil that could be done with sponge gold. There were certain properties about the use of well prepared crystal gold that led him to believe that there were cases which could be treated with more facility by its use than gold foil. He related an achievement of Dr. Allport, of Chicago, in restoring the exterior and cutting edge of teeth, which to him was more gratifying to look upon than the productions of a Raphael The front incisors were separated as if a file had been passed between them a quarter of an inch thick, nearly down to the gum. These teeth had been built up and restored to their original shape, their approximate edges almost touched, and they were perfectly adapted to mastication. They had been used nineteen months. He understood that Dr. Allport used foil in connection with crystalline gold in the same cavities. He intended when he went home to try the article.

Dr. ALLPORT was here requested to state his manner of operating with crystal gold. After paying a high compliment to his friend Dr. Blakesley, of Utica, N. Y., he said that in the commencement of his practice with crystal gold, a little more than three years ago, if he used it at all in a cavity, he used it alone, unconnected with any other form of gold, but for the past year, he had used it in connection with foil, in the shape of pellets, blocks, or cylinders, as the case might seem to demand. He had found by experience that the secretions of the mucous membrane of the mouth, more than the saliva, possessed properties which made it almost impossible to make the crystals adhere, after they had once become moistened. This difficulty is met with, more particularly where the cavity extends to or under the free edges of the gums; and to obviate it in such cases, he was in the habit of introducing cylinders or blocks, at first, until the gold was raised quite above the soft parts, and then finishing with crystals. When two sides only of a tooth were remaining, he allowed the blocks to extend quite through from a proximal to a proximal surface, and after making a firm floor or base in this way, he finished with crystals. When he wished to build up one side of a tooth, or an independent crown, he had found it usually impracticable to use foil, and had been compelled to resort to the crystals alone.

Dr. ALLPORT said he was not one of those who advocate the use of this form of gold entirely, for his experience had taught him that foil was better in some cases. One great desideratum, both to the dentist and the patient, was the saving of time. So far as this is concerned, he regarded foil as preferable to crystals, and where he could use it and make his operation just as serviceable to his patient, he regarded it as his duty to do so. Yet crystal gold with him was a very important agent, and with all due respect to those of the profession who say that they can do anything

with foil that can be done with gold in this form, he believed that good crystal gold possessed qualities which enabled skillful operators to accomplish with it what could never be done with any other form of gold now known to the profession. And here he would remark that much of Watts' gold, prepared previous to last year, was bad, and even now, he regretted to say some of it, like much of our foil, was not what could be desired. Though it was said to be all alike, there was a difference from some cause or other. The difference did not seem to be so much in its purity, as in its working properties. The gold contained in some packages possessed a kind of softness and would adhere almost instantly, whilst that in others had a kind of *corky* quality, and it was only with great difficulty that it could be made to adhere at all.

The objection has been urged against the use of this form of gold, by certain distinguished operators, that many of their fillings made with it had failed, and therefore it was unfit for use. This he regarded as unsound, and he would like to ask these gentlemen if, on going back to their earlier practice with foil, the same objection could not be urged. Shall they say from this that foil is unfit for filling teeth? The truth is that it requires months and years to learn to put in good fillings with foil, and after we have once learned, we find it hard to change. The manipulation with crystal gold is so different, that it requires certainly about as long practice to learn to use it properly, as it does to use foil; but in his judgment when the art was once acquired, much more could be done with it in certain cases than with foil.

It was said that crystal gold filling would break down, and that the bottom would become soft, while the surface remained hard. For his part he did not know of any changes taking place on the inside, more than the outside, which had a tendency to soften *hard* fillings. He believed that if they were put in soft originally, they would remain soft, but if put in hard, they would remain hard, under all circumstances; and in proof of this, he related the following case, occurring in his own practice. In January, 1855, he filled a superior canine tooth with crystal gold. The whole dentine of the tooth, as far as the crown extended, was gone, and so thin was the enemel, that while excavating the cavity, the instrument could be seen through any part of it, and the nerve cavity was so much enlarged from decay, that he could compare it to nothing but a quill. The filling was worn until April last, or about that time, when the crown was broken off by biting some hard substance, and came away in pieces, leaving fragments of the enamel remaining on the filling. He removed these fragments at the time, and filled the edges where the filling came in contact with the edge of the enamel, and polished the surface which had been before the bottom of the filling. He had seen this filling but a few days before the meeting, and it stood firm; an abiding witness that when crystal gold is put in *hard* it will remain so, as well at the bottom as at the top, all the theories in the world to the contrary, notwithstanding.

The great amount of labor necessary to put in a good crystal gold filling, was, in the minds of many persons, an objection to its use, but in his judgment, an operator should never flinch from doing his whole duty, however much the labor may be to him, or the pain to the patient, provided only it is *bearable.* It required often as much will and determination to perform a proper dental operation, as it did for a general to win a battle, but with a determination to accomplish all in our power, with an appreciation of the importance of the organs operated upon to the patient,

with good material, used as may be dictated by good sterling common sense, we could all of us achieve much more than we were apt to imagine.

Dr. SEABURY used more foil than crystalline gold, but in certain cases he knew he could accomplish what he could not with foil. Dr. Allport expressed his experience.

Dr. ARTHUR, of Philadelphia, had in various times and places borne testimony to sponge gold, and had not yet ever any reason to change his opinion. Any failures in his operations he could attribute to some defect of manipulation or some other circumstance which made it exceedingly difficult to perform a good operation. Though some of the fillings were after a lapse of time, not perfectly satisfactory in appearance, yet even then, there was no discoloration below the surface, and no diminution of the density of the filling.

But he no longer used sponge gold; its use had led him to the discovery of an entirely different method of operating from what he had previously pursued, and he had since used gold foil in an entirely different manner. He had been told by a number of gentlemen that this was no new thing, that they had been in the habit of depending upon the adhesive quality of gold foil for years. Such had not been the case with him and many others that he knew. A great many manufacturers of gold foil had been led to make an effort to avoid the objection of the want of an adhesive quality, which prevented making a good operation when used in the ordinary way. But he was assured by gentlemen who had worked in gold foil, that it was only necessary to produce a perfectly pure article of gold, to possess without annealing this strong adhesive quality, so that it could be welded together in a solid mass like sponge gold. If, therefore, gold foil could be made to adhere in the same manner as sponge gold, why could it not be used in the same manner and with the same results? Every manufacturer, he had been told, could make it with this adhesive quality, and it could be used precisely as sponge gold, with the exception that the instrument should be somewhat sharply serrated and somewhat more hardened. It was well known that gold foil, no matter how adhesive in the beginning, in a very short time, if exposed to the atmosphere, would lose this adhesive property. But this change which was confined entirely to the surface, could be entirely removed, and the gold restored to its original condition by subjecting it to a very moderate heat—something short of a red heat—ordinarily called annealing. It was only necessary to place it upon a plate and hold it over a spirit lamp until the plate becomes hot. In an article published by a prominent writer on electric metallurgy, it was stated that any metal held in a current of air becomes covered with a film of air, and that it is impossible to get a galvanic deposit upon that surface until it is exposed to heat. It could not be a film of moisture because a sheet of paper could be passed into water and removed perfectly dry. He had endeavored to call the attention of the profession to this method of using gold foil, and a number about Philapelphia were now using it to the exclusion of every other, and said that no inducement could bring them back to any other material. Dr. A. referred to an operation performed by Dr. Colwell, where foil was used in an upper molar tooth, with nothing remaining but the interior surface and a small portion of the outer wall, the most beautiful operation he ever saw, which could not be surpassed by the use of crystal gold.

Dr. MILLER, of Massachusetts, said that he had some experience in the use of crystal gold, and he regarded it as a very valuable auxiliary to the profession. He had

no doubt that this form of gold did possess valuable qualities, for upon that subject, they had been enlightened with the discoveries of men of experience and learning. He had used sponge gold and cylinders in combination, and they worked well together under certain circumstances. He was an eclectic himself, and used the best material at his command adapted to suit the particular case in hand. When a new thing was introduced into the profession he investigated its merits, and adopted whatever he found to be valuable about it. He knew of no other way to perfect success. Life was made up of experiments. If objection was made to experimenting, it would cut off all improvement. His object in the practice of his profession was, to make a thorough examination of all new discoveries in the line of his art, and adopt whatever was practical and valuable.

Dr. SEARLE, of Springfield, mentioned a case of Dr. Arthur's that came under his notice, where a superior bi-cuspid with only the outer half of the crown remaining, was built up so that it articulated perfectly with the lower one.

In regard to cylinders, he had used them for twelve years. Dr. Clark had said at Philadelphia, that he was the original discoverer, and he had no doubt he was *an* original discoverer.

Dr. CLARK, of New Orleans, said he borrowed the idea from Dr. F. H. Badger, supposing that he used them entirely. Dr. B. would not state how he did it, but he (Dr. C.) went to work to find out, and as he thought discovered it. He shortly afterwards found that Dr. Badger repudiated the idea entirely that teeth could be filled with cylinders alone, saying that he only used them in the centre of the cavity. He did not claim any original discovery and never had. What he had learned, he gave freely to the profession, as it was every man's duty to do.

Dr. SEARLE did not himself claim any originality; the idea came to him in 1840, through a student of Dr. Keep, of Boston.

Dr. HASSEL, of New York, had not yet seen any better work done with crystal gold than could be done by the same operators with foil. He was one of the earliest to experiment in the use of sponge gold. He manufactured it himself in the most pure manner by means of an electro-galvanic battery; but it was expensive and therefore impracticable. Sponge gold in a pure state was essentially the same as gold foil, and subject to the same conditions. Though it would not change when tested by strong acids, yet in some mouths it would turn black, showing that the fluids of the mouth was a powerful solvent. Gold foil, if rightly and skilfully used, would stand all the tests required.

Dr. MCKELLOPS, of St. Louis, had been very unfortunate at first in the use of crystal gold, whether from imperfect manipulation or because the article obtained was imperfect, he could not say. He found that the plugs would change after a lapse of time. The article first used, however, was condemned by Mr. Nichols, of the firm of A. J. Watts & Co., who furnished him with a better article, which so far as he had used it, he found excellent. For large, saucer-shaped cavities with a small margin to hold in the fillings, he had found it very advantageous. It should not be condemned after three or four trials. He had used some five or six ounces of the superior article, and he believed that by the next meeting of this Convention, they would all be satisfied with it. He was very much pleased however, with Dr. Arthur's method, and was going to Philadelphia to learn it.

Dr. GUNNING, of New York, said that according to the general experience of gentlemen who had used crystal gold, it required a great amount of pressure to make

it solid. The density of the filling was a matter of great importance, and it seemed that more labor and time was required upon crystal gold than upon foil. That being the case, though a strong patient of forty years of age might well bear the great amount of pressure requisite with impunity, it would be frightful, perhaps, to a young delicate female. Time, to a person suffering pain, is a matter of some consideration. There were certain fillings which on account of their not being subject to wear, did not require so great density as others; would it be proper in such cases, under an excited condition of the nervous sensibility, to put in a larger quantity of crystal gold, subjecting the patient to great suffering, and running the risk in some cases, perhaps, of ruining the tooth in the socket, when foil could be inserted in less time and with less pressure and pain. The object of the dentist should be, not to see how dense a filling he could make in all cases, but to make a filling which would in all probability outlast the tooth in the socket. He contended that theoretical nicety was not their aim, but to make fillings best adapted to the particular cases. He would not concede that crystal gold was the best article in cases which would not admit of great pressure; and in gold foil, he insisted, that they had an article which they could control, and with it they could, in most cases, fill cavities in such a manner as to perfectly exclude moisture and save the teeth. The foil manufactured was not all equally adhesive, but they could use the more adhesive foil for cavities where the greatest care and nicety was required.

Dr. G. not having completed his remarks, it was moved that the speaker be allowed ten minutes longer.

Dr. BALLARD moved as an amendment, that the discussion continue for the remainder of the morning session.

Dr. CLARK, of Louisiana, opposed the motion, as he wished some time to be devoted to the exhibition of improvements in instruments.

Dr. TAFT moved an amendment to the amendment, by continuing the discussion till one o'clock.

Dr. SEARLE said there were complaints that the old hackneyed subjects were kept before the Convention, and day after to-morrow would be Sunday.

Dr. RICH moved the previous question, which was carried.

The question being put on the amendments severally, and on the original motion, they were all rejected.

Eight minutes being left of the time allotted to this discussion,

Dr. FLAGG, of Philadelphia, obtained the floor, and remarked that, as regards the materials for filling, they knew infinitely more of foil than any other preparation. Work done by such men as Hudson, and many other deceased brethren of the profession, had stood forty, fifty, and sixty years, and fillings made twenty-five years ago, could not be told from work done twenty-four hours ago.

As to the method of using foil, it should be so used as to be the most thoroughly condensed, with the least amount of labor. He had been pleased with the remarks of Dr. Arthur.

Dr. TAFT moved that this subject be resumed at four o'clock this afternoon. Lost.

AFTERNOON SESSION.—A motion was made by Dr. McQuillen and carried, that the Convention resume the consideration of the subject of the best preparation of gold for filling teeth.

Dr. MCQUILLEN said that his experience had not been a successful one in the use of sponge gold. But gentlemen would say that his experience had been so limited,

that he could not arrive at correct conclusions in regard to this matter. He had not arrived at the conclusions he had stated, so much from his own experience, as from the failures of eminent operators. Therefore he stood forward as a witness in support of the objections urged against sponge gold, viz: its permeability, discoloration and disintegration.

He had tried the plan of annealing, explained by Dr. Arthur, and found that he could not introduce as much gold into a given cavity, as with the ordinary gold foil that he received from Abbey. He believed the annealed gold hardened under the instrument so rapidly as to choke up. There was a point where they must cease to use the instrument when operating with ordinary gold foil, as there was a point where the painter must lay aside his pencil; otherwise they might get such a temper in the gold that the next gold put in would not adhere. He had reason to infer from his experience in the use of annealed gold, that the specific gravity of a filling, was not equal to that of one made with the ordinary foil, judging from the quantity used in the cavity.

Dr. BALLARD said he could speak with some confidence upon this question, gained by an experience of several years. Had used crystalline gold for three years with great satisfaction. Had seen within the past week the first operation he had ever performed with it; it had proved perfectly successful. The result of his experience could be summed up in a very few words.

It was beyond question that a vast amount of *imperfectly* prepared gold had been made and used, imperfectly purified and imperfect in its microscopic structure. He had nothing to say in favor of such material, but wished only to speak of pure and properly prepared crystalline gold, which contained all the elements desired for successful operations. Many failures had undoubtedly occurred where the very best gold had been used, but his own experience taught him that these failures were the result of imperfect manipulation. He did not know a man anywhere who did not meet with failures in his own practice, no matter what material he used. His failures with crystal gold were fewer than with foil, the circumstances being the same. He considered that this was the test, all should be guided by i. e. the relative proportion of failure and success with each material. Did not wish to be understood as objecting to the use of foil—used it a great deal—alone and in connection with crystals; would rather give up practice than give up the use of either material. He would urge the following properties as entitling it to consideration: First, its exceedingly delicate structure, which enabled the dentist to place it securely in cavities so exposed that nothiug else could be retained in them. Second, its perfect purity, of which the essay made by Dr. Townsend's order was sufficient proof. Third, its density when perfectly packed, as illustrated by the experiment of Dr. Dwinelle. Fourth, its welding or adhesive properties, of which the specimen shown by Dr. Asay was uncontrovertible proof. In regard to fillings becoming porous, as had been frequently asserted, he begged to call particular attention to certain facts. A good filling was simply a mass of solid gold, perfectly surrounded by unyielding walls of tooth bone. It was an impossibility for such a filling to become porous without expansion, and it could not expand without disrupting the filling or splitting the tooth. Solid gold could not so change in the mouth as to become porous. A porous filling, therefore, must have been porous from the first, once solid it could not change, in that respect at least.

Permeability and disintegration were both dependent upon a porous condition of the filling; that being disposed of, they need no further remark.

Another objection had just been urged, viz: discoloration; pure gold rarely discolored; the objection was as forcible against pure foil as against crystal gold. Discolorations did take place where from some unforeseen cause, a defective operation had been performed, or defective material employed; such a state of things should not be brought forward as an argument against the use of gold in any form. He frequently used crystals in conjunction with Dr. Clark's cylinders, or Dr. Arthur's annealed gold, sometimes using all three in the same cavity.

Dr. Taft considerd the method adopted by Dr. Arthur, as a very great advance in the usè of gold, and he intended to try it. Leaving that out of view, he preferred in most cases crystal gold to gold foil. There was a confusion of terms in speaking of sponge gold, many applying it to all the preparations that had been made and called by that name, perceiving no difference between the varieties that had been produced. There were three forms in use for filling. Sponge gold he considered to be simply granulated gold obtained from precipitation; by various methods of precipitation they could get an article with which they could fill deep cavities. Then there was structural or fibrous gold. Then again there was another form in which its crystals were larger and more definitely formed, than in the two previously mentioned. In that variety which had no structural character, but was simply gold in a state of minute division, they had to depend entirely upon its property of cohesion in introducing it into a cavity. This form of sponge gold was not reliable, although occasionally tolerable fillings might be made with it. In the structural or fibrous gold—which might be denominated crystalline—besides the adhesiveness, it was retained in the cavity by the fibres folding upon one another. Again in gold formed of definite crystals, they not only had the cohesion property, but the interlacing of the angles of the crystals to retain the filling in a solid state. In the use of foil well annealed, there was a cohesion doubtless sufficient to retain the particles together; but in the crystalline gold there was besides cohesion, this interlacing of the particles which they did not have in foil. No doubt with sufficiently strong walls they could build up foil into a pyramid as described by Dr. Townsend, but he thought it required much more skill with foil than with crystal gold; and he conceived that there were many cases where crystalline gold could be used where foil could not, as in the case described by Dr. Clark, where one-third of the approximate edges of the incisors are broken away.

The President (Dr. Harris,) said that the preservation of the natural teeth was of more importance than the replacing of those organs by artificial substitutes. He rose not so much to give his own experience in the use of crystalline gold as the results he had seen from its use by other operators. He had been in the habit of using crystal gold for three or four years. During the first two years of his practice in using it, the results were not so satisfactory as he could have wished, but more recently they had proved so, although he was not yet prepared to lay aside the use of foil. He used three ounces of foil to one of crystalline gold. When he had heard doubts expressed by several members of this Convention, with regard to the practicability of making fillings with crystalline gold of as much value and permanency as those made with foil, he felt it due to the manufacturers of crystalline gold to say, that he had seen fillings of this material that had been used in the mouth upward of two years, which were in a most perfect state of preservation, equal, and in some cases, when all the circumstances connected with the cases were considered superior to any fillings with foil.

A case occurred to him at this moment, of a young lady who formerly resided in this city, who recently came into his office to have her teeth examined. Many of her teeth were made up almost apparently of gold, several crowns having been destroyed. One of these crowns, in particular, had been built up with crystalline gold, and although it had been there two years, it was as perfect as any filling could possibly be. There were thirty fillings or more in all, made by Dr. Ballard, of crystalline gold, two years ago. An upper molar that had been decayed away, so that if he was not mistaken, the walls were entirely gone with the exception of a small portion which came down below the margin of the gum, was built up and answered all the purposes of a natural tooth. He could name other operators, Dr. Dwinelle particularly, who had realized his fullest expectations with regard to this article. He was fully satisfied that there were cases in which this form of gold could be

used more advantageously than foil; but on the other hand, he might say the same in favor of foil. It would be difficult for him to say which he regarded as the most valuable, though if he could have but one he would hold on to the foil, having used it so long that he had become in that respect, something of an "old fogy."

Dr. RICH said, the difficulty of procuring foil that was sufficiently adhesive, even after he had annealed it, had induced him to try the merits of crystal gold. The experiments he had made with it had demonstrated beyond a doubt, that its particles would adhere, it could be made solid, and when solid it was impermeable.

Among the experiments made to ascertain these facts, were the following: Portions of this gold were packed in the cavities of teeth with ordinary instruments that he used every day in his practice. One of the filling so formed was drawn out into wire, another was rolled into plate, and a third was hammered into plate on the anvil. Another portion that formed a small disc about an eighth of an inch thick, was secured on the end of the tube of an air pump; a drop of water was then placed upon the upper surface of the disc, and the tube exhausted with the full force of the pump, (which was a powerful one,) the water remained upon the surface. The disc was then ground down to about one half its original thickness, and the experiment repeated with the same result. The objection to this gold that it requires more time to consolidate it than is necessary for foil, will not be sustained when it becomes better known. When he first used it, a filling of crystal gold required double the time that he would have spent on one of foil Now he packed and finished it with as great facility as he did foil, and found it more easy to prepare, of convenient sizes, for introducing into the cavity. In difficult cases, as, for instance, where the filling has to be built up independent of the support of the walls of the cavity, crystal gold can be used with much greater facility than foil. This, is a very important advantage. The improved crystal gold, as manufactured now, by A. J. Watts & Co., did not of itself produce discoloration, it was *pure* gold without the least trace of any other substance, and therefore it could not discolor the teeth.

Several professional friends had told him, that they had cases in their practice, where they had used crystal gold, and it had produced discoloration; as he (Dr. R.) doubted that the gold had been the cause of that effect, he had requested them, for their mutual satisfaction, to allow him to see the fillings removed, and to examine the cases critically. In several instances they had done so; the fillings were removed, and the gold, and the cavities examined, and in every case it was clearly evident that the fault was not in the gold, but in the manipulation, either in preparing the cavity or in packing the gold, and in every case, it was easy to decide to which of these two causes the failure was to be attributed.

The statement is often made, that the surface part of a crystal gold filling, becomes quite solid and hard, while the rest of it, remains soft and porous. When this occurs, it is the fault of the manipulation; if one part of the filling could be made solid, the whole could. The amount of pressure that made the surface dense would have had the same effect upon any other part of the filling, if it had been applied there. The proper method was, to pack the fillings solid from the bottom of the cavity, and introduce the gold in small portions, each of which must be made as solid as may be desired, before the portion which is to be packed on top of it is introduced. One of the most valuable properties of crystal gold is, that it can be made of any given degree of density of which gold is susceptible, with much less pressure, than would be necessary to produce the same degree of density in foil. In finishing the surface of the gold; when the cavity is filled, this peculiarity must be borne in mind, and in consolidating and finishing the gold at the margin, great care is necessary to avoid working it too much at that point, for if as much labor was spent upon it, as would be necessary to make the margin of a filling of foil as solid and as hard as it ought to be, the margin of the crystal gold filling would become brittle, and would easily break and crumble up. The same effect would be produced with foil; when it reached the same degree of density, that would also become brittle.

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METALLIC DIES. By Professor P. H. Austen.

(Concluded from page 202.)

Zinc.—This metal in its simple unalloyed state well deserves the important place it holds in the laboratory of the dentist, who moulds in sand. Metals or alloys harder than zinc are more infusible and liable to greater shrinkage: whilst those which are more fusible and contract less, gain these advantages at the expense of hardness. In the first class we have gun-metal, or bell-metal, and alloys of zinc with small proportions of iron, antimony and copper. In the second class may be instanced alloy No. 4 of the table, in which case we see that the hardness of the alloy is diminished in a greater ratio than its shrinkage, making it, by consequence, less valuable, the difference in the melting point of the two not being sufficient to give any practical advantage.

We have alluded elsewhere to the amount of shrinkage of zinc and the manner in which it prevents accuracy of adaptation. Summing up briefly, in the worst possible case—a very deep arch and the entire mucuous surface *very* hard—*first*, the plate will bind on the outside and so not fit the ridge: but supposing it to fit down upon the alveolar border, it will *secondly* fail to touch the abrupt sides of the deep arch, and *thirdly* it will, by a still wider interval, fail to come in contact with the roof of the mouth. Many use zinc in such cases, burnishing or hammering the plate down upon the plaster cast; thus injuring the cast and only partially correcting the difficulty. Others resort to the practice of bending the edges of the plate. To those who adopt this expedient (without which we fear dental mechanical practice with many would soon to be at an end) we would suggest the proprie-

ty of dispensing with the air-chamber, so universally (and often so unnecessarily) used; inasmuch as by this method of bending down the edges of a plate touching in no other portion of its palatine surface they secure the largest kind of an air cavity.

A better practice than either of the above named is to complete the swaging upon a fusible metal (Nos. 11 to 16) die, with the same counter-die used for the zinc, placing pieces of paper or sheet lead upon the counter where the plate fails to fit the new die. By this means we avail ourselves of the hardness of zinc and the non-contractility of the fusible alloy. In the writer's judgment this is the best plan in all cases where zinc alone will not give a secure adaptation. It may be well here to caution the operator who is inexperienced in the use of fusible alloys. When poured into a sand matrix, they retain their fluidity much longer than zinc, and are very liable to be spoiled by the upward escape of the vapor of the sand. The sand mould should be thoroughly dried, and then allowed to cool. This practice of drying the mould is safest in every case, whether with zinc or fusible metal. If the haste of the operator will not permit this, it may be well for him to know that by dampening the sand with * soapy water he will materially lessen the risk of "blowing." Why soap should exercise any such influence we must leave to others, or to another opportunity, to inquire.

LEAD.—In its pure state is useful only as a counter-die; for which purpose it is improved by the addition of antimony, forming various grades of type metal: or of tin forming soft solder, or pewter. The composition of type metal varies in different foundries, and is usually kept secret. There is often a small per centage of copper and tin and sometimes of bismuth; but the chief ingredient is antimony, varying from $\frac{1}{4}$ to $\frac{1}{8}$. The former is used for the smallest types, is hard and very brittle; the latter is used for the largest types. An alloy of medium sized type and lead, equal parts, forms an excellent material for the counter to a zinc die: so also is alloy No. 8, and either is cheaper than tin alone.

* For this hint we are indebted to Dr. R. T. Reynolds, of Philadelphia; and recently we had brought to our notice an instance in which a locomotive was stopped from inability to generate steam because one of the men had washed his hands with soap in the water used in the boiler. The boiler had to be entirely emptied and re-filled before a head of steam could be raised.

TIN.—In its pure state, more suitable for the counter than for the die, though used for this latter purpose by many who practice the "dipping" method. To such we would recommend, for the counter die into which the cast is to be dipped, lead 9, antimony 1, or lead 4, tin 1; or pure tin, and for the die, alloy No. 9, or some of the more fusible alloys, Nos. 11 to 16. In this selection, it is to be remembered that the metal for the die must be the harder and at the same time the more fusible, whilst both should shrink as little as possible. It is commonly thought that the shrinkage of the counter compensates that of the die, and makes the latter a fac simile of the plaster cast. A few moments' reflection, with the aid of a simple sectional diagram, will convince any one of this error, bearing in mind that all shrinkage is to be measured towards the centre of the mass.

Those practicing this method of obtaining dies, cannot be too strongly impressed with the importance of keeping the two kinds of metal as distinct as possible, and so marked that they will not be mistaken each for the other. The greater care is necessary when the alloys resemble each other. It would be a vexatious mistake to dip the cast in No. 9, and pour No. 8 upon it; quite as annoying this, as to have lead in the zinc ladle; or, where die and counter are made of the same metal, to pour the latter too hot. The first accident requires for its avoidance systematic order in the laboratory, while ordinary care will prevent the two latter. The slovenly or confirmedly careless operator had better avoid having a variety of metals or alloys, as his frequent mistakes will more than balance any advantage to be derived from their use.

We shall conclude this article, which has already exceeded its intended limit, by a few brief remarks upon the more fusible alloys of the table. Bismuth is an essential component of all such alloys, and seems to have greatest effect upon their fusibility, although itself more infusible than tin. For all ordinary purpose, No. 13 will answer. No. 14 differs only in having been repeatedly used, thereby being more thoroughly mixed. It becomes closer grained, is harder and less brittle. Where a still more fusible metal is desired, the proportion of bismuth should double. In Nos. 15 and 16, the weight of bismuth is equal to that of the tin

and lead together. So in Rose's fusible metal, (L. 1, T. 1, B. 2,) and an alloy 3 L., 2 T., 5 B., said to fuse at 199°.

The difference in these four last named is in the varying relative proportions of lead and tin. They fuse at nearly the same temperature, but vary in their degree of brittleness. Further experiment is required to determine which of all possible combinations of these three metals is best. If bismuth is in larger proportion, the alloy will be too brittle. The same will happen if the tin exceeds the lead. The alloys, Nos. 15, 16, will, we think, be found to answer every purpose required of this class.

These metals must be repeatedly melted to insure their thorough intermingling. The union is probably in part chemical and part mechanical. To this partial mechanical mixture is perhaps to be attributed the pasty, mush-like consistence of these alloys in their semi-fused state—the more fusible component melting and holding in suspension the particles of the less fusible ingredients. In this state it may be taken up in a spoon and dashed on to a green plaster cast, which should be cold and unvarnished, and may be surrounded merely with a strip of paper. In a few moments it will be hard enough to keep its shape without the paper, which may then be removed and the sides of the cast trimmed to any required shape. At a temperature of about 150° to 175° it can be cut like cheese. Another method of obtaining the counter die, is by the *clichee* process. Pour the metal into a suitable ring, remove the film of oxyd from the surface with the edge of a card, then when the metal is just on the point of setting, bring the cast down upon it with a quick steady motion. If properly done, the impression will be very sharply defined and free from any air holes; but to do it skillfully requires practice. The counter-die obtained by either process must be allowed to cool in the air, not in water, for, if there is the slightest trace of dampness on the surface, it will spoil the die next to be taken. Adhesion of the die and counter where the same metal is used for both, is prevented by, 1st, coating the counter with whiting, 2d, having it quite cool, 3d, pouring on the metal for the die in a pasty, semi-fluid condition.

Some of our readers may think that on some points we have been unnecessarily plain and diffuse; others may detect errors

of statement; and others wish that we had been more specific and explanatory. The first should remember that what is to them an old story may to others be quite new: to the rest we repeat the remark with which we began our essay, that it is not claimed to be either infallible or exhaustive. Our object will have been fully answered if we shall have suggested to some any new and useful idea, or shall incite others to the further investigation of a subject that we feel convinced will repay a more extended research.

Reported by Roberts & Warburton.

WARNER *against* GRIFFIN.

United States Circuit Court, November 14, 1856.

JUDGE NELSON'S CHARGE.

GENTLEMEN, the patentee in this case presents a claim for the discovery, first of the cement or compound described in his specification, which is used in constructing the gums of teeth; and in the second place, the process of setting teeth by means of this cement, thereby making a continuous gum in connection with the teeth. Now your attention must first be called to the construction of this patent, with a view of ascertaining the exact thing which the patentee has discovered and has patented, and for the protection and enjoyment of which discovery or improvement, against alleged infringers, this suit has been brought.

The patentee states in his specification, that "the cement may be formed of any of the known fluxes, combined with silex, wedge-wood and asbestos,"—those three articles intermixed with gold and platina scraps; and then he goes on and gives the proportions of the three articles, and of the materials used as fluxes, for the purpose of fusing the mass. Any fluxes may be used. There is nothing in the patent, as it respects this portion,—that is, the fluxes used for the purpose of fusing the other three ingredients, presenting any claim to those articles. They may be taken at large, and at the discretion and judgment of the artist

or the manufacturer, but they are to be combined with silex, wedge-wood and asbestos, in the proportions which are stated in the patent, and which is the formula that the patentee prefers in the manufacture of cement: that is, silex 2 oz.; wedge-wood 1½ oz.; asbestos 2 drms.; and then he gives flint-glass, borax, feldspar, and kaolin clay as the fluxes. Now the cement is manufactured out of these ingredients, according to the directions given by the patentee. And then we have the *process*. He says: "I construct my plates, and arrange the teeth thereon in the usual way. I then apply the cement in a plastic state upon the outside, between and around the base of the teeth, so as to form an artificial gum upon the teeth and plate. The teeth and gum are then covered with a mixture of asbestos and plaster of Paris, mixed with water, and reduced to a plastic state. The teeth being thus covered, the wax is removed from the inside of the teeth, and the cement is applied thereon, and also upon the plate, so as to fill up all the interstices around the base of the teeth. When the cement and mixture thus applied have become thoroughly dry, the work, so united, is put into a furnace sufficiently heated to fuse the cement, and immediately after the fusion thereof, it is withdrawn from the furnace and cooled slowly. The plaster mixture is then removed, and a gum color applied."

Now this process, which I have called your attention to, of constructing the gum in connection with the teeth, is embraced in his first claim, in the following words:

"What I claim as my invention, and desire to secure by letters patent, is a new mode of setting mineral teeth on metallic plates, by means of a fusible silicious cement, which forms an artificial gum, and which also unites single teeth to each other and to the plates upon which they are set."

I ought to have called your attention previously to another clause. After the gum color is applied, he says:

"The work is again placed in the furnace as before, and when fused is withdrawn and cooled as before, by which means the metallic back plates, solder and blowpipe are dispensed with, although back plates may be attached to the teeth, if desired."

Now with respect to this process, which is the first claim, ac-

cording to the true construction of the specification, the patentee claims to have invented a compound by which, in pursuing the process which he has described in setting the teeth, and forming a continuous gum, both on the inside and outside,—he claims that by this discovery of a compound, and the process of applying it, in constructing the gum in connection with the teeth, that he can thereby dispense with the back plates and soldering which were used before, although back plates may be used, if desired.

I do not agree with the learned counsel for the plaintiff, that upon a true interpretation of this specification the patentee claims to embrace within his discovery or improvement in the manufacture of teeth, the use of this cement, including the back plates or fastenings of the teeth, according to the previous mode; but on the contrary, according to my view of the patent, he claims to have invented an article and a process of using it, by which these back plates may be dispensed with, and the cement and the process will constitute a complete, practical, and useful article. That back plates may be used, if desired, is merely a suggestion outside of this invention. It may be used as it was used before,—may be added to the invented article, by using it in the construction of the teeth; but this is outside of the thing claimed to have been invented; and unless, according to my view of the patent, the cement and the process described by the patentee, excluding the back plates and fastenings, constitutes a practical and useful article, the invention is not the subject of a patent. Because the object of the law in requiring the patentee to describe his invention, is that persons skilled in that art or branch of knowledge may construct or manufacture the article by pursuing his description; and it is quite plain that the instruction which is given for the benefit of the public, in the manufacture of that article, would lead the manufacturer to make it, excluding or dispensing with the back fastenings. The others may be used if the manufacturer desires it, but they are not necessary, they are not material, they may be left out or dispensed with; and therefore the article manufactured by the process described by the patentee, aside from and independent of these fastenings, by means of back plates, must be a practical article, and useful for the purpose for which it is described and constructed.

Now as respects the degree of utility that is another question. If the article, thus constructed, dispensing with the back fastenings, is not the very best article of the kind, why that fact or that view will not invalidate the patent. If the article is better by adding the back plates than it would be dispensing with them, that is not a reason for invalidating the patent. The validity of the patent does not depend upon its degree of utility, as compared with other articles of a similar description. It may not be as good, yet if it be new, it is patentable, and the inventor is entitled to the benefit, and it is no ground of defence to set up on the part of the infringer, that, although he uses it, yet there is a better article used, which he might have used. That is not an answer. Although it may be inferior in degree, and so little in demand that the patentee may not derive any great benefit from it, yet if it is new and practicable, it is a patentable subject, and he is entitled to be protected. But then it must be an article so useful, that when devoted to the purposes for which it was discovered and applied by the inventor, it will be practically beneficial,—reasonably useful,—in order to constitute the invention a patentable subject.

Now, upon the part of the learned counsel for the defendant, it has been insisted, and testimony has been produced, in the progress of the trial, to show that an article made according to the specification, both as to the compound and to the process, if followed strictly, dispensing with the back plates,—is a failure,—is not practicable, and cannot be used successfully.

On the part of the learned counsel for the plaintiff, they have introduced testimony for the purpose of refuting this ground of defence,—they maintaining that if constructed precisely according to the directions in the specification, dispensing with these back plates, it is still a useful article, still practical, and the proper subject of a patent.

Now I am not going to occupy your time in going over this testimony. I have no doubt it is fresh in your recollection, and you will be able to recall the material witnesses and facts upon this question, and come to an intelligible determination. It is a question of fact—one which belongs exclusively to the Jury to determine.

[*Conclusion in next number.*]

ON THE PRESENCE OF FIBRILS OF SOFT TISSUE IN THE DENTINAL TUBES.

By JOHN TOMES, F. R. S., Surgeon-Dentist to the Middlesex Hospital.

The dental tissues, as parts of the human system, have received their full share of attention from anatomists. Papers have from time to time appeared upon this subject, each observer confirming or correcting the views of his predecessor, or adding new facts to those already recorded, until this field of investigation seemed fairly exhausted, at all events of new matter.

Histologists, I think, now agree that dentine is made up of series of tubes, which radiate from one or more cavities, situated within the interior of the tooth. In their way outwards the tubes branch freely, and connect themselves through their branches with each other; thereby establishing a network of communications throughout the whole substance of the dentine. The tubes on the one hand, after running their course, become lost in the anastomosing branches near the outer surface of what has been termed a dentinal system, on the other, terminate by open mouths on the inner surface of the system,* or pulp-cavity. This cavity being occupied by an organ rich in blood-vessels, has led to the opinion generally entertained, that the tubes are canals for the conveyance of nutritive fluid.

M. Kölliker† states, "During life the (dentinal) canals contain a clear fluid, and cannot therefore be readily detected in recent preparations."

In sections which have been dried, the tubes become very distinct, and we may sometimes, on adding a colored fluid to the preparation when under the microscope, observe the tubes becoming gradually filled.

The foregoing conditions of the dentinal tubes are so easily demonstrated, and appeared to indicate so satisfactorily the

* "On the Structure of the Dental Tissue of the Order Rodentia," by John Tomes, Philosophical Transactions, Part 2, 1850.

† Manual of Human Histology, by A. Kolliker. Translated and edited by George Busk, F. R. S., and Thomas Huxley, F. R. S. Vol. ii. page 41.

offices of these canals, that the subject was regarded as one which had been fully investigated. There are, however, certain physiological conditions observable in teeth, when forming part of the living body, which the recorded knowledge of the histological characters of dentine fails to explain.

If, for instance, a portion of enamel be accidentally broken from the surface of a tooth, so that the dentine becomes exposed, the surface of the latter will be highly sensitive to any variation of temperature from that of the mouth, or to the contact of foreign bodies, even pressure from the tongue giving pain. The degree of pain is not, however, increased by increasing the pressure. Then, again, in operating upon the teeth for the removal of carious dentine, it is almost invariably found that the dentine immediately below the enamel is much more sensitive than that situated deeper in the tooth.

If the pulp of a tooth be destroyed, either by an instrument or by an escharotic, the sensitiveness of the whole of the dentine is immediately lost, no pain being afterwards experienced when it is cut either near the enamel or the pulp-cavity. The teeth of young subjects are much more sensitive than those of older people, and this is more especially the case when they are attacked by caries.

The dentine of teeth which are rapidly decaying is much more sensitive than that of teeth in which the destruction progresses more slowly. The former condition is indicated by the light color of the decomposing part, together with the extent of tissue involved; the latter by the deep brown color, and the comparative hardness of the affected dentine. In certain cases of caries, the softened tissue appears to be extremely sensitive, so that the patient can scarcely bear its removal; but when the instrument reaches the comparatively healthy dentine, the pain, although present, is much less severe.

In any case, however, the dentine loses its power of feeling pain if the pulp be destroyed; but if, after the destruction, the pulp-cavity be perfectly filled with gold, the tooth, in cases suitable for such an operation, may retain its color and usefulness for a considerable period. The dentine will not, however, recover its sensitiveness.

These several conditions indicate sufficiently clearly that the sensitiveness of the dentine is dependent upon its connexion with the pulp of the tooth, and that it has no inherent sensibility in its own hard tissue; although the tissue may remain for a considerable period without any manifest change, if the root of the tooth be healthy, and the dentine be protected from the influence of the fluids of the mouth.

After a portion of dentine has been for some time exposed, or if the exposure be brought about gradually by the slow wearing away of the enamel, that acute sensitiveness which has been described is not then found to exist. In parts which have been subject to the foregoing conditions, it will on examination be found that the dentinal tubes, the peripheral extremities of which have been exposed, are more or less obliterated in some part of their course between the surface and the pulp-cavity.

On reviewing the various circumstances under which dentine evinces sensibility, and those under which that sensibility is lost, it is difficult to avoid the conclusion, that the dentinal tubes are in some way the medium through which sensation is distributed through the substance of the tissue. But if the sole office of the tubes be the conveyance of nutrient fluid derived from the pulp, the difficulty of accounting for the sensitiveness of the dentine remains, inasmuch as we have no instance of sensation being manifested in a fluid. We might seem to get out of the difficulty by assuming that the dentinal tubes are constantly filled by fluid, and that pressure made upon the fluid at the exposed ends of the tubes is felt by the pulp at their inner extremities. This assumption does not, however, account for all the circumstances of the case, failing altogether to explain the greater sensibility of the dentine at one part of the tooth than at another.

The want of accordance between the views usually entertained upon the structure of dentine and the physiological conditions manifested by that tissue when in connexion with the body, has wholly arisen from assuming that the dentinal tubes are solely for the conveyance of fluid, and that they are otherwise empty. With the hope of gaining some further knowledge upon this point, I commenced a series of observations, the results of which it is the main purpose of this paper to communicate. When

these investigations were commenced, I had but little expectation of finding that one of the most important parts in dental structure had been overlooked, namely, that each dentinal tube is permanently tenanted by a soft fibril, which, after passing from the pulp into the tubes, follows their ramifications.

With proper care in manipulating, nothing is more easy than to demonstrate the existence of the dentinal fibrils, in any tooth which has been recently extracted. If a thin section be made in the plane of the direction of the tubes, and then placed in dilute hydrochloric acid until the whole or a greater part of the lime is removed, and the section be afterwards torn in a direction transverse to that of the tubes, many of the fibrils will be seen projecting from the torn edges. It is desirable, in repeating the experiment, to place the decalcified section upon a slide before tearing, as in moving it from the surface upon which it has been torn, some of the longer fibrils may be folded back upon the body of the specimen and thus become obscured. Where the separation between the torn surfaces has been but slight, we may often see a fibril, unbroken, stretching across from the separated orifices of the tube to which it belongs.

It is not necessary, however, to decalcify dentine in order to show the fibrils. If a similar section to that already described be divided with the edge of a knife, many of these delicate organs will be seen, but they are usually broken off much shorter, many of them scarcely projecting beyond the orifices of the tubes. Again, if a minute portion of dentine be cut with a sharp knife from the surface produced by fracturing a perfectly fresh tooth, the same appearances will be seen, but not with the same certainty and distinctness as in the previous examples.

In order to demonstrate the connexion of the fibrils with the pulp, fine sections should be made with a sharp knife from the edge of the pulp-cavity. In this manner I obtained the specimen from which Mr. De Morgan has been kind enough to draw the accompanying illustration, showing the fibrils stretching from the pulp to the displaced dentine, and some of them passing out on the other side of the fragment. That the fibrils proceed from the pulp may be seen by carefully fracturing a fresh tooth with as little displacement of the fractured parts as possible; and then,

by slowly removing the pulp from its place in the tooth, we shall be enabled to examine the fibrils which have been drawn out from the tubes. By this procedure some of the fibrils will be withdrawn from their normal position in the dentine in the greater part of their length, a few of them retaining short lengths of their branches, but sufficient to show that they have come from the branches of the dentinal tubes

If a carious tooth be selected in which the diseased part is of a deep brown color and of tolerably firm consistence (conditions indicating that the disease has been slow in progress), it will be seen, on making a transverse section of the tubes in the affected part, that the fibrils have been consolidated and their outline lost, the circumference of the tube alone being distinguishable. Indeed the tubes, when in this state and seen in this view, have the appearance of solid rods. But if the section be made in a plane with the tubes, we shall be enabled to trace the calcified fibrils. They appear to have a greater power of resisting decomposition than the surrounding dentine, and hence preserve their rigidity. Some will project from the edge of the specimen, while others may be seen broken within the tubes, and more or less displaced. Were they made of glass the fracture could not be more abrupt and defined, or their outline more distinct. I have on a previous occasion described a zone of consolidation limiting caries,* but I was at that time ignorant of the existence of the tube-fibrils, otherwise I should have more fully understood its import.

[*Conclusion in next number.*]

College of Dentists in England.—A meeting of the members of the dental profession was held on Tuesday evening (Dec. 16,) at the Freemason's Tavern, London, for the purpose of considering the rules, framed by their committee, for the governance of the body, and for the election of council and officers for the ensuing year. About one hundred gentlemen assembled. J. Robinson, Esq., was unanimously elected president.

* Lecture on Dental Physiology and Surgery, by John Tomes. Published by Parker, West Strand.

NECROSIS OF INFERIOR MAXILLA FROM THE VAPOR OF PHOSPHORUS.—Removal of the entire Lower Jaw.—Recovery.—Remarks upon Phosphorus Disease.

By JAMES R. WOOD, M. D., Surgeon to Bellevue Hospital, New York, &c.

(Continued from page 173.)

I take this occasion to acknowledge my indebtedness to Dr. Geo. Amerman, house surgeon to Bellevue Hospital, for his attention to my patient, and the foregoing details of the case.

Remarks.—Phosphorus disease, or necrosis from exposure to to the fumes of phosphorus in the manufacture of lucifer-matches, was first noticed in Germany. Lorinser, of Vienna, published the first account of this disease in 1845, and reported a number of cases. Soon after, Heyfelder, of Erlangen, and Strohl, of Strasburg, published cases; and in 1847, Drs. Von Bibra and Geist,* published a separate work. In the following year accounts of the disease were published in England; and in noticing a case, in the surgical reports of Guy's Hospital (1846–47), of separation and exfoilation of the lower jaw, from exposure to phosphorus, in the mauufacture of lucifer-matches it is stated, that the disease was previously noticed to be not uncommon in those working in phosphorus. Mr. Stanley alludes to this disease in his Treatise on Diseases of Bones. Cases have been occasionally reported in English periodicals; and in the *Lancet* for 1850, (vol. i., p. 41,) there is an interesting clinical lecture, by Mr. Simon, on the subject, with the full details of a case. Phosphorus disease does not seem to have been frequently noticed in this country, if we may judge by reported cases; yet the causes exist among us in all their intensity. I am aware, indeed, of but a single case which has been placed on record, and that was observed by Dr. Bigelow, of Boston. That this disease is more prevalent in this country, than might be inferred from this single case, is evident from the several cases ap-

* *The Diseases of the Workmen employed in Lucifer-Match Manufactories, and especially the Affection of the Maxillæ, produced by the vapors of Phosphorus, etc.* By F. ERNST VON BIBRA, P H. D., *and* LOREZ GEIST, M. D., Erlangen, 1847. See also *British and Foreign Med.* Chir. *Rev.*, 1848, vol. i., p. 446.

pended to this paper, which I have been able to collect, and the case kindly communicated by Dr. Van Buren.

As this affection has not been brought before the American reader in any detail, the following summary of what is known of its nature, progress, and results, may not be inappropriate in this connexion :—

That phosphorus is the destructive agent in this disease, has been proved by experiments upon animals. Rabbits exposed to the fumes of phosphorus, under circumstances similar to those which determine the diseases in man, are similarly affected.

Another fact seems clearly established, viz : the vapor of phosphorus must come into immediate contact with the periosteum or bone, in order to excite the morbid process. This explains, in the first place, why but few, comparatively, are affected who work in these manufactories ; and, in the second place, why the lower jaw is more frequently the seat of disease than any other bone. For it appears that those only suffer who have decayed teeth—the defect in the teeth allowing the fumes of phosphorus to penetrate to the periosteum. So important is this latter fact, that the government of Erfurt has passed a decree, that no person having decayed teeth shall be allowed to work in lucifer-match factories. In a factory in this city, no workman is allowed to return to his work for a week, after the extraction of a tooth.

That particular part of the work which gives rise to the greatest quantity of vapor of phosphorus is the most dangerous to operatives. This occurs in the process of preparing the paste, and in dipping. In the first process, a high degree of heat is necessary, and large quantities of the fumes of phosphorus are given off, which fill the rooms. In the second, the paste is spread upon a metal plate ; with a temperature sufficiently high to keep it liquid, over which the dipper stands, and necessarily inhales the vapor which arises. Where the ventilation of the establishment is well conducted, the " dipper" is the only operative affected by the phosphorus ; but where the ventilation is bad, and the fumes of the phosphorus, disengaged, not only during the process of mixing and dipping, but also in counting and packing, are confined, workmen engaged in other departments are similarly affected. This fact finds striking confirmation in the history of lucifer-match

factories of this city. In the old factory in Twelfth-street, the ventilation was poor, and the mixing room was in communication with the work room. As a consequence, whenever the paste was prepared, the whole room became filled with the suffocating vapor of phosphorus. In this establishment, phosphorus disease seems to have been not uncommon. In the new factory, the phosphorus room is in a separate building; and so perfect is the ventilation, that there is scarcely a smell of phosphorus in the building. No case has yet occurred in the new factory.

The general effects of phosphorus upon the workmen in these factories, are differently stated by different writers. The German authors do not seem to refer the diseases of operatives to this cause; but, on the contrary, regard the laborers in these establishments, as healthy as those in any other. French writers, however, ascribe to the inhalation of the fumes of phosphorus, certain bronchitic affections under which this class of persons are found to labor. English observers agree with the German, in regarding phosphorus vapor as harmless to the individual; and some even allege that the operatives in these factories, enjoy better health than before entering them. I have not been able to learn that workmen, in these factories in this city, suffer unusually from bronchitis, or indeed any other affection which could be traceable to phosphorus, except the disease under consideration. Two intelligent medical students from my office, Messrs. Bird and Johnson, have visited the lucifer-match establishments of New York, and have been kindly received by the proprietors, who gave them every opportunity to thoroughly examine the premises. In their report to me, with the appended cases which they were able to collect, the following note is made of the appearances of the operatives:—"They seemed as healthy as those of our cotton factories in Lowell, or our woolen factories in Lawrence, or our flax factories in Andover, Mass."

The peculiar form of disease here considered, is a periostitis.—It has been a question,—whether the disease is excited by direct contact of the phosphorus with the periosteum, or whether it does not first enter the blood, contaminate the system, and secondarily induce necrosis. This question would seem to be definitively settled by the following considerations: 1.—Operatives exposed

to the fumes of phosphorus do not suffer from any special or general malady, showing contamination of system, or the existence of a cachexia. 2.—The disease attacks only denuded bones. So well established is the fact, the operative is considered safe until he has carious or extracted teeth.

We consider it established then, that the phosphorus must find access to the periosteum, when the morbid process is set up. It more often affects the maxillary than other bones, for this reason; and the inferior maxilla than the superior. That other bones are eqaully affected, when the phosphorus vapor reaches the periosteum, is proved by experiments upon animals.

The frequency with which the different bones of the face are affected in this disease, is exhibited by the following collection of cases:—

Whole No.	Max. Sup.	Max. Inf.	Max. Sup. and Inf.
66.	22.	36.	8.

The pain of the jaw, which ushers in the disease, is generally mistaken for toothache. It is usually slight at first, and intermittent, and is due to the slow process of periosteal inflammation which results in the formation of a lamina of bone beneath the periosteum, and around the old bone. This takes place around the base of the jaw; owing to the gravitation of the exudation from the inflamed periosteum. This, the first stage, is chronic and may be indefinitely prolonged, without causing much inconvenience to the patient. The second stage begins with an attack of accute inflammation in the diseased part, excited by cold, or otherwise; there is great pain and swelling of the soft parts; the new formation is destroyed, and discharged, with an abundance of offensive pus; and the old bone remains a sequestrum in the midst of the products of suppuration, to be subsequently discharged in successive portions. This stage is attended with great suffering and constitutional disturbance; and not unfrequently patients die from exhaustion during this process of suppuration, or from gangrene of the soft parts. If the disease pass on unarrested, the jaw becomes more and more involved, large portions exfoliate, and the whole finally becomes implicated. Few survive to this period, and a still less number witness the completion of the morbid process, in the discharge of the entire jaw.

Mr. Stanley exhibited a patient of St. Bartholomew's Hospital, suffering from this disease, whose entire lower jaw had exfoliated, excepting one condyle.

The prognosis in these cases is very unfavorable. When the disease first comes under notice, the periosteal inflammation has generally long existed, and new formations already separate the bone from its covering. More frequently the suppuration is established, exfoliations of bone are taking place, and the whole morbid process is in active progress. The system now breaks down under the exhausting discharges and poisonous emanations from the jaw; and the miserable subject of this destructive disease, falls a victim to its inroads upon his strength, long before the completion of the process of exfoliation.

The regeneration of bone, in cases where extensive necrosis of the jaw occurs, or where it is entirely removed, as in the present instance is an interesting and practical question. From the investigations of Von Bibra and Geist, we learn that the new deposit derives its nutrition from the periosteum only, and is, therefore, the product of this membrane. Unlike callus, it has no communication of the Haversian canals with the bone upon which it lies, while its medullary canals are vertical to those of the bone. They conclude that the new formation has a lower degree of development than true bone. The following is the average of several analysis of bone and the deposit, made by these authors; and, considering the authority of Von Bibra in the chemical examination of bone, they are worthy of note:—

Bone.		Deposit.	
Organic constituents	31·42	Organic constituents	38·16
Inorganic "	68·58	Inorganic "	61·84
	100·00		100·00

The excess of organic matter in the deposit is striking, and it would be interesting to know in what relation this deposit stands to the new bone. Some authors doubt the possibility of new bone being formed in these cases; but the case under consideration proves their reasoning untrue. Althongh there may not be a complete regeneration of bone, the reproduction has evidently begun, and small portions have already separated. As the pe-

riosteum, for the most part, still remains, there seems no reason why new bone should not be formed; unless the peculiarity of the periosteal inflammation excited by the phosphorus prevents it. The fact just stated, that bone, or a substance strikingly resembling it, already exists in the track of the bone removed, refutes the supposition.

The treatment of this affection in the early stage is that adapted to periostitis, and in the later stage, necrosis. Free incisions of the gums, both to relieve the tension which results from inflammation of the periosteum and to procure local depletion, will be required. These incisions should be made wherever there is inflammatory swelling, and freely down to the bone. General antiphlogistic remedies will be useful, according to the condition of the patient. When suppuration is established, tonics should be freely administered, to sustain the general health, and exercise in the open air enjoined; locally, detergents may be used with benefit; such as, gargles containing astringents,—myrrh, or chlorides, as the individual case may demand. These measures, however, are but adjuvants in the process of exfoliation.

In the advanced stages, where necrosis has taken place, and nature is endeavoring to separate the sequestrum, an opposite plan of treatment is indicated. An immense discharge of fœtid matter issued from the diseased gums, rendering the patient's life miserable, and disgusting to his attendants; his system gradually gives way, and death almost inevitably closes the scene, unless art comes to the assistance of nature. In this, the last stage of the affection, surgical interference seems imperatively demanded. I am aware that some surgical authorities advise to leave these cases to nature, and simply sustain the system. But if we had not reason and experience in analogous diseases to guide us in this last extremity, we certainly have in the case already detailed a clinical fact worthy of consideration. The benefit which this patient derived from surgical interference was never surpassed in my experience. The first operation was followed by the most decided improvement of her general condition, and the last has restored her to comparative health. I should, therefore, always advise to remove the dead bone as early as possible, and thus relieve the system of a source of great irritation,

which nature labors long and often ineffectually to accomplish.

If this is judiciously effected, and the general health preserved, we may confidently anticipate that by a regeneration of the osseous tissue, not only will the deformity be inconsiderable, but the functions of the inferior maxilla will, to a considerable extent, be preserved —*N. Y. Jour. Med.*

Prof. P. H. AUSTEN in reply to a request that he would furnish us with some information, relative to a new method of mounting artificial teeth, recently patented by Dr. A. A. Blandy, of Baltimore, says:

"All the details of the CHEOPLASTIC process have been demonstrated to me, and I have made trial of it in my own practice. When you come to have the same knowledge of it, you will, I think, agree with me in regarding it as a valuable addition to the resources of Dental Art.

"The plate is formed and the teeth attached, not by the threefold operation of swaging, backing, and soldering, but by the single one of *casting*—from which feature the process takes, as you perceive, its name, and which at once suggests a question as to the difference between this and the well known "Block Tin" process. An important difference is in the metal used, the properties of which give a plate of superior firmness and durability, and render it available in a large class of cases, where tin could not be used. Besides which, the method of securing a correct adjustment of the teeth, the shapes of the teeth or blocks, and the composition and preparation of the moulds, are all characteristic of this process, and different from any heretofore brought under my notice.

"The process is readily learned, can be expeditiously done, and with ordinary care admits of *certainty* in all its steps. The finishing a piece, on its removal from a mould, is a short work, where the pattern plate has been properly shaped; especially so if the operation of electro-gilding is dispensed with. The gilding is not an essential feature of the work, although in my own practice I should always do it.

"This economy of time is an important consideration, in many cases to the patient, to the operator always. I regard it as of more moment than the great economy of material which will be to some perhaps a more attractive feature of Cheoplasty. But economy of time or material do not warrant the adoption of a process, unless the result is, to say the least,

equal to that attainable by other means. I will give you concisely a few points in this new method, which, I should, I think, commend it to the attention of the profession.

"The work has a property, valuable to the patient—the ease with which it may be cleansed—a property which time does not impair.

"Not less gratifying to both, patient and operator, is the complete accuracy of fit—premising, of course, a correct impression. There are no metallic dies, for the contractility or softness of which allowance in some form is to be made.

"There are none of the uncertainties, incident to many, in the ordinary methods, such as the warping of plates, breaking of teeth, risks of repair, etc. A broken tooth can be replaced with great facility, and at no risk to the adjoining ones. Incidentally may be here mentioned the fact, that the same teeth or blocks can be mounted several times over—a peculiarity characteristic of this process, that might prove convenient; in replacing temporary sets, correcting blunders of "articulation," such as happen so many; or in rendering available the teeth of such pieces as have been replaced.

"The apparatus necessary for the Cheoplastic process is neither heavy, bulky nor expensive. A small trunk would hold it, a boy might carry it, and a moderate purse could purchase it. I say nothing of the right to use it: that is a matter to be settled with the patentee. Any discussion of dental patents would be out of place here. Some other time I may give you my reasons for thinking it a spurious etiquette, which condemns them as unprofessional.

"As regards extent of its application, it may be used in all cases, from a single tooth, attached by blasp or suction, up to a full set; and be adapted to teeth without gums, single gum teeth, and block work. It has strength and durability, and is susceptible of a beautiful finish. Applied to block work or single gum teeth it need have no greater weight than the same on gold. In the case of plate teeth it has advantages, in its accurate fit and cleanliness, which make one disregard the slight increase in weight. All workers in the "Continuous Gum" process are aware how secondary a matter is this question of weight. When we consider the fact that plates (without air chamber) have been made to support 5 lbs., it is not probable that the comfort or security of a well fitted plate will be much affected by a difference of two or three pennyweights. It has always been my practice to make my work strong, to the entire disregard of any increase in weight, necessary to accomplish this end.

"I did not sit down as a teacher of this process, to indoctrinate you into its mysteries—it could not be done on paper. Should my few remarks here offered suggest further inquiries, I shall take pleasure in answering them so far as my experience will enable me to do so. Meanwhile be so kind as to accept what I am conscious, is an imperfect answer to your inquiry.

"Sincerely yours,

P. H. AUSTEN."

Baltimore, Dec. 30, 1856.

A CARD.

In the last issue of the RECORDER a report of the suit of Warner *vs.* Griffin was worded in such a way as to make the result liable to be misunderstood.

Lest the dental profession should be misled with reference to the validity of my patent for continuous gum work, I would state that the most vigorous efforts have been made for some four years past to void it. These efforts have thus far proved abortive. The patent still stands a valid patent, and the title in the patentee, although it has been stated that I had parted with it. This report has grown out of the fact, that after the termination of the suit against Dr. Hunter, a compromise was agreed upon between him and myself; concessions were then made by both parties to the effect that all further hostilities between them should cease. Dr. Hunter desired to retain certain rights and privileges which were considered equivalent to one thousand dollars, which I agreed to pay, and gave him two notes of five hundred dollars each, with a lien upon my patent for the payment of the same; the last note matured this month. These notes will be paid though not quite as soon as was intended, in consequence of being thwarted in my efforts (to introduce my patent) by antagonistic movements, which gave rise to subsequent litigation and consequent delay in realizing the necessary funds, as was expected from the patent. I have made arrangements for the liquidation of this claim, provided Dr. Hunter carries out the agreement on his part, for which the notes and lien were given, and also for the unpaid costs of suit at Cincinnati.

J. ALLEN.

No. 30 Bond street, New York.

January 12, 1857.

EDITORIAL.

DENTAL COLLEGES.—An attempt is now being made to obtain the passage of a bill by the New York Legislature for the incorporation of a Dental College, to be called "The New York College of Dental Surgery," to be located in New York city. The published report of the bill names John Johnson, M. D., Thomas D. Andrews, M. D., Henry Dodge, Samuel Strong, John Little, Dr. James Martin, Dr. Robertson, Philip Rodman, and *their associates*, as the body corporate. If there are any prominent dentists of the city of New York connected with this movement great care has been taken to keep their names out of the newspaper reports, or else they have been sadly neglected by the reporters.

That a Dental College is needed, either in this city or State, at this time, is a very questionable matter, particularly so when we take into consideration the fact, that it is but two or three years since a "New York College of Dental Surgery" (at Syracuse) terminated a short but useless existence; that the Dental College at Cincinnati is only upheld by the efforts of the largest Dental Society ever known; that the Philadelphia Dental College is barely paying expenses, and that the pioneer institution, the Baltimore College of Dental Surgery, with the strongest faculty the dental profession of the United States can furnish, has but about fifty students to grace its sixteenth session.

The Dental Profession occupies a peculiar position. It seems to have just escaped from the scale of a mere mechanical art and to have wandered or stumbled upon a professional platform. In practice, so greatly at variance are its different branches, so promiscuously intermingled and yet so closely interwoven, do we find the scientific, mechanical, theoretical and practical, that no one but a thoroughly educated and experienced dentist can judge of the qualifications of a professional brother. No stronger proof of this is needed than that furnished by the hundred of laudatory certificates (honestly given by our most influential citizens) found appended to the petty pamphlets, private circulars and public posters of all our most notorious quacks. We know of men in this city who cannot speak or write five consecutive sentences of the English language correctly, who could, if necessary, hang their parlor-walls with "flattering testimonials, obtained from our most influential citizens." These recommendations to public patronage are usually based upon the temporary success of some piece of artificial work, the beauty and finish of which depend more upon the maker's skill as a jeweller or watchmaker than his ability as a dentist. The most beautiful specimens of dental mechanics we have ever seen, were made by a man intellectually of so low a grade, that after repeated efforts he gave up in despair his long cherished hope of graduating in a Dental College. This illustrates clearly one of the anomalies of our professional position. Where men of the stamp alluded to are recommended to the public as practitioners of Dental Surgery, those

who have *no teeth to lose* may with *safety* and often with great benefit avail themselves of their services; but those who have teeth to be saved learn only when too late the bitter experiences of misplaced confidence. So much for the purely mechanical branch of our practice. Is the operative department likely to be more correctly estimated by the public? We believe not. If there is one fact more universally acknowledged by the dental profession than any other it is this, that as a general rule the worst operators we have are those who having graduated as physicians and failed to establish themselves in practice have "taken up dentistry" as a dernier resort, basing their claim for patronage not upon their practical abilities as dentists, but upon their extensive literally, scientific or medical acquirements, an assumption in which they are too often supported by a sacrificed, if not a sacrificing community. An experienced dentist can at once sift the wheat from the chaff, no quack or pretender can impose upon him, and in this respect he stands alone. In view of these facts the expediency of establishing a College of Dental Surgery is a question of trifling import compared with the great question which arises relative to the selection of a Faculty. If the Faculty is to be chosen or elected by a Board of Corporators unable to form a correct estimate of the requirements demanded for a proper fulfilment of the duties entailed upon the various chairs or unqualified to judge of the acquirements possessed by candidates for election, wherein is the public to be benefitted? What is to prevent a Board of Corporators (chosen from without the Dental Profession) from being as grossly deceived in their choice of a Faculty as their equals in position, intelligence and education too often are in their choice of a dentist. Certainly the danger is greater. Those who have nothing to lose and every thing to gain, are usually clamorous for office, while those who are really competent to teach have to be sought out and would then only as a matter of duty sacrifice their personal comfort and pecuniary interests to the advancement of their profession and the public good. The chances are that these latter would be passed over and the result would be the election of an inferior Faculty, imperfectly imparting their meagre attainments to the future dental profession, and entailing upon the public an incalculable amount of suffering and misery with the very unsatisfactory consolation of knowing that it is all done by legislative authority. We hope that our legislature, should it see fit to charter a Dental College, will, with its usual good sense and practical judgment, place authority in the hands of those only who are competent to exercise it, such parties are not to be found out of the dental profession.

In the present Number of the Recorder we republish a pamphlet by Mr. Tomes of London, descriptive of the filaments of animal tissue existing in dentine. It is interesting and important, and will amply repay close reading.

We find it necessary to say a word for our Publishers, in regard to unpaid subscriptions. With previous numbers, notices have been sent to those who have allowed the year to pass without remitting for the present volume. As customary, the 12th Number (the next), will not be forwarded, until the amount of subscription has been received.

New-York Dental Recorder;

DEVOTED TO THE THEORY AND PRACTICE OF

Surgical, Medical and Mechanical Dentistry.

Vol. X.] DECEMBER, 1856. [No. 12.

ON THE PRESENCE OF FIBRILS OF SOFT TISSUE IN THE DENTINAL TUBES.

By JOHN TOMES, F. R. S., Surgeon-Dentist to the Middlesex Hospital.

(Continued from page 253.

Professor KÖLLIKER, in his account of the development of dentine, describes and figures processes extending from the peripheral cells of the dentinal pulp in developing teeth, † but he does not recognize the tube-fibril; indeed he, as before cited, describes the tubes as filled with fluid. M. LENT, in a paper published last year, gives a similar description to that of M. KÖLLIKER, but says that the cell-fibres are best seen in teeth which are but little advanced in development.‡ Mr. HUXLEY states that in a solitary instance he observed a fibre pass a short distance into the dentine.§

Both M. KÖLLIKER, and M. LENT regard the process which they observed extending from the peripheral cells of the pulp in forming teeth, as organisms for the devlopment of the dentinal tubes. The latter author, near the conclusion of his article on the development of dentine, states, *the processes of the cells are the dentinal tubes.* He observes further on, that the fact first observed by MULLER and then by KÖLLIKER, that the dentinal tubules possess separate walls, which can readily be isolated, is explained by the history of the development; the wall of the dentinal canal is identical with the cellular membrane of the ivory cell.

† *Loc. cit.*

‡ Zeitshcrift fur wissenschaftliche zoologie, herausgegeben von C. T. SIEBOLD und A KOLLIKER, Sechster Band, 1855, p. 121.

§ On the Development of the Teeth, and on the Nature and Imports of NASMYTH's "persistent capsule," by THOMAS HUXLEY, F.R.S., Quarterly Journal of Microscopical Science, No. 3, 1853.

I do not propose entering upon the subject of dentinal development in the present communication, but shall confine myself to showing that the dentinal tubes are in the normal condition occupied by fibrils of soft tissue. The above extracts from M. LENT'S paper have been made in order to show that he has not recognized the existence of permanent tube contents, although he has probably seen the fibrils themselves.

The nature and office of the dentinal fibrils remain for consideration. If a fibril be examined in its natural condition, by the aid of an eighth of an inch object-glass, it will be found to consist of an almost structureless tissue, transparent, and of a comparatively low refractive power. In glycerine the fibrils are scarcely visible. At present it admits of doubt whether they are tubular or solid. In some cases there is an appearance of tubularity; but being cylindrical this may be a mere optical effect. When accidentally stretched between two fragments of dentine the diameter of the fibril becomes much diminished, and when broken across, a minute globule of transparent but dense fluid may sometimes be seen at the broken end, gathered into a more or less spherical form. These appearances may be explained by assuming that the fibril consists of a sheath containing a semifluid matter, similar to the white fibrillæ of nerves; but whether such a conclusion can be justified admits of doubt. The manner in which the dentinal fibrillæ terminate in the pulp I am at present unable to decide. In favorable specimens they may be traced a short distance into the pulp, but whether they are terminated by cells or in any way connect themselves with nerves, I am unable to determine. The dimensions of the fibrils are the same as those of the interior of the dentinal tubes.

The conditions under which sensation is manifested in dentine have been already stated, together with those under which it is lost, and the difficulty of accounting for these phenomena has been pointed out. The recognition of the fibrils of dentine will, however, I think, remove the difficulty, and enable the physiologist to explain why under certain circumstances that tissue is susceptible of pain, while under other conditions the sensitiveness is lost.

That the dentine owes its sensation to the presence of the den-

tinal fibrils cannot, I think, be readily doubted, seeing that if their connexion with the pulp be cut off by the destruction of the latter, all sensation is at once lost. It is by no means necessary to assume that the dentinal fibrils are actual nerves before allowing them the power of communicating sensation. Many animals are endowed with sensation which yet possess no demonstrable nervous system; and we may find many points in the human body highly sensitive without our being able to demonstrate nerves in such numbers as would account for the pain uniformly experienced from the puncture of a needle, upon the supposition that the needle had in each case wounded a nerve. Additional evidence in favor of the view that the fibrils possess sensation may be obtained by examining their condition in diseased teeth, and the conditions attendant upon the disease. In those cases in which the fibrils are consolidated in the manner already described, there is perfect absence of pain when the part is removed, but so soon as the instrument reaches the healthy dentine, more or less inconvenience is felt. If, on the other hand, there is no consolidation of the fibrils, but the pulp is yet living, the operation of removing the carious part is productive of pain, even from the commencement; indeed pressure upon the surface of the softened tissue gives rise to discomfort. If in such cases the softened dentine be examined, fibrils may here and there be found but little altered from their natural appearance.

The greater degree of sensitiveness observable in the dentine immediately below the enamel, that is, at the point of ultimate distribution of the dentinal tubes, and consequently of the fibrils, may be fully accounted for on the supposition that the latter are organs of sensation, just as in nerves of sensation the point of greatest sensibility is that of their ultimate distribution.

The recognition of the dentinal fibrils must lead to a modification of the opinions hitherto entertained as regards the office of the tubes, namely, that they are for the circulation of fluids only. The presence of soft tissue would not, however, hinder the slow passage of fluids; and that fluids do pass through or by the side of the fibrils is rendered probable by the fact, that they are capable of undergoing change at the parts furthest re-

moved from the pulp. When the fibrils become calcified near the surface of the dentine, the hardening material must have been derived from the pulp when the consolidation has taken place in the crown of the tooth.

The foregoing observations will, I think, warrant the conclusion, that the dentinal fibrils are subservient to sensation in the dentine, and are the channels by which nutrition is carried to that tissue.

Further evidence may be adduced in favor of the latter opinion. I have already observed that dentine may remain for a time apparently unaltered if the pulp be destroyed and the cavity filled with gold. After a while many teeth so circumstanced become loose, and when removed it is found that a considerable portion of the dentine has been removed by absorption; a state of things in some respects similar to that which accompanies the loss of teeth in old people. Here we find, that, although the pulp may be living, the tubes of the root of the tooth have become consolidated, and the part rendered translucent. Teeth so circumstanced will on examination exhibit loss of dentine. A similar condition may be found in teeth the crowns of which have been lost; the roots are then diminished by absorption. In each of the instances adduced, the teeth may, however be retained for a lengthened period in the jaw, but such persistence is always accompanied by the deposition of cementum to an unusual extent upon the roots. These phenomena have been brought forward to show, that the presence of the dentinal fibrils in a state of integrity is necessary to the normal condition of the tooth; that if from any cause they are consolidated or destroyed, nature will coat over the root with cementum, and often to an extent amountiug to disease, or will set up a process for its removal. The dentine will be diminished by absorption, the root will be thrown up on the surface of the gum, or the socket will disappear, and the tooth by the one or other process, or by a combination of each, will be cast off as an organ no longer fitted for a place in the living body.

ADDENDUM.

Since the preceding communication has been in the possession of the Royal Society, the head of a marsupial animal which had been preserved in spirit was placed at my disposal, the teeth of which were in a condition favorable for showing the dentinal fibrils, should such be found to exist.

A paper upon the structure of the dental tissues of Marsupiata will be found in the Philosophical Transactions, Part II. 1849, in which the continuation of the dentinal tubes into the enamel is described and figured; together with those minor differences of structure which are peculiar to the several divisions of this order of Mammalia.

After the discovery of the dentinal fibrils, the examination of a favorable specimen of enamel so peculiarly constituted became a matter of considerable interest, in order to ascertain whether the soft tissue which occupies the dentinal tubes is continued into those of the enamel. I am indebted to my friend Professor Quekett for the jaws of *Halmaturus* ——, a member of a genus in which the majority of the dentinal tubes situated in the crown of the tooth are continued into the enamel, and pass to within a short distance of the external surface of that tissue. Thin sections were made both of the incisor and molar teeth by the usual process of grinding. These were treated with dilute hydrochloric acid, and were examined at short intervals after their immersion in the solvent fluid. The acid acted upon the enamel with great rapidity; and in the course of a few minutes the edge corresponding to the outer surface of the tooth disappeared, leaving in its place a series of fine flexible filaments. More prolonged action of the acid led to a further loss from the surface of the enamel, and also to the solution of the part in contact with the dentine. In this case the fibrils were seen proceeding from the extremities of the dentinal tubes across the space which had been occupied by the enamel, from thence they were continued through that portion of the latter structure which yet remained undissolved, and ultimately formed a delicate fringe floating freely in the fluid by which the preparation was surrounded. If a section presenting the above conditions be again placed in acid the whole

of the enamel will be dissolved, leaving the dentine in those parts which have been invested with enamel, bordered by a thick fringe of long delicate fibrils, each one being continued from the peripheral extremity of a dentinal tube. In the dentine the fibrils occupying the tubes were as readily detected as in the human tooth, and presented the same general appearances and relations.

The facility with which the fibrils were demonstrated in the enamel of the teeth of the Kangaroo, induced me to select for examination specimens of human teeth in which the dentinal tubes are continued for a short distance into the enamel. Under similar treatment similar results were obtained. Wherever the dentinal tubes could be traced into the enamel, the presence of the contained fibrils could be demonstrated by the aid of hydrochloric acid.

Cavendish Square, June 17th, 1856.

Beported by Roberts & Warburton.

WARNER *against* GRIFFIN.

United States Circuit Court, November 14, 1856.

JUDGE NELSON'S CHARGE.

(Concluded from page 248.)

It is also set up as another ground of defence, that this article is not new, and that therefore the patent is invalid. Now as it respects the process of manufacturing the article, in order to determine whether it is new or not, you must take into consideration the compound or cement as described by the patentee, because it is that article, that specific cement, which he claims to have discovered and which he uses in the process of constructing artificial teeth; and in your inquiry whether or not the article is new or old, you must keep in your minds the question whether a cement substantially like that described by the patentee has been used heretofore in the construction of artificial teeth, and not whether artificial teeth may not have been constructed after the same process—that is by setting up the teeth upon a plate,

and by putting around it a continuous gum of cement, of some description, and backing or hardening it. That is not the inquiry; but the inquiry is, whether previous to the invention of Dr. Allen artificial teeth had been constructed according to this process, which process is not new, but a substantially similar cement, or a similar compound. That is the question. And hence, even if you should come to the conclusion that teeth had been formed according to this process, previous to the invention of Dr. Allen, by any sort of compound or cement, that would not be an answer to the action; because that is not what is claimed as the thing discovered or invented. That is, first, the cement as described in the patent, or the compound described and used according to this process in constructing the article. You must not only take into consideration the process, which may not be new, but also the character of the cement which is used in the construction of the article.

Now you have a great deal of testimony that has been introduced, both on the part of the plaintiff and of the defendant, bearing on this question. I am not going over it. It will be for you, after a proper consideration of the testimony, to determine for yourselves whether or not this cement and process was new, or not at the time the plaintiff claims to have made the improvement.

Now there is another question in the case that has been litigated and contested throughout the trial, and which it will be necessary for you to take up and determine. It is insisted, upon the part of the defendant, that the proportions which are specified by Dr. Allen, in making his cement, will not, if strictly followed, create or be the means of producing a practical, useful article. You have heard the witnesses on both sides of this question. Experiments have been made on both sides. It is alleged on one side that if the patent is followed to the letter, the article manufactured, according to the description will be useless—that it will not be practicable,—that it will be rather an imposition on the public. Upon the part of the plaintiff it is claimed that, on the contrary, it will produce a useful, practical article. Now all I have to say to you upon this branch of the case is this: that you must be satisfied—(because the patentee assumes this burthen,)

—that by following the description according to the letter of the patent, a useful and practical article can be manufactured, by a skillful person, or one of competent skill; otherwise the subject is not patentable; because, to sustain the patent, a manufacturer who, after it has expired, and the public are entitled to the benefits of the discovery, shall follow the description and directions to the letter, must be enabled to make a useful and practical article, or else the patent is invalid. I know it was said by the plaintiff's counsel that there might be slight variations, and that those slight variations would not operate to invalidate the patent. I agree to that, so far as it regards the question of infringement. I agree that *there* a slight variation of the proportions of the articles by an infringer would not be a ground for evading the patent; but when the question is whether the article manufactured according to the patent is a useful or practical article, it must be so in a case where the manufacturer has followed the proportions according to the description, to the letter; and if it fails after that process has been adhered to or followed, the patent cannot be upheld.

Now these are all the observations I shall make to you on the first claim. The second claim is as follows: "I also claim to be the inventor of said cement or compound, a full and exact description of which is herein given."

Now that depends upon the question whether this compound, as described, and its proportions, is new, or whether it is old. That is a compound of silex, wedge-wood, and asbestos, in the proportions set out in the patent, with any of the usual fluxes. If that is a new compound—a new cement never before having been manufactured, it undoubtedly constitutes a patentable subject. Otherwise not. It was said by the counsel for the defendant that this claim was defective, upon the ground that the claim was not for the art of manufacturing a compound, as distinguished from the article itself after being thus compounded. Well that would be so upon this condition or view of the case: if this mixture of the three ingredients with any of the known fluxes had been before made and was known, and the patentee had taken up that old mixture, and by changing the proportions of the same ingredients had made a different article—an article of a different

character, then the patentee must claim for the art of composing the compound, and not for the compound itself; because upon the hypothesis I stated, that was an old article. But in this case the patentee claims the compound itself as a new article, never before mixed in the way he has described it. But it must be remarked in connection with this second claim, that this article or compound, formed into cement according to the description of the patentee, when used in the process claimed under the first claim in the manufacture of teeth, according to the mode described by the patentee, must produce a practical, useful article, —because the utility of this cement depends upon the use of it in the process of manufacturing artificial teeth; and if, when used in the way for which it was combined, it was not successful, then it will fail for the want of utility. But if, on the other hand, when used according to the description in the specification, a useful article is produced, then in my apprehension, the second claim would be maintained of the patent.

Now I have very nearly finished what I intend to say in this case. You will first turn your attention to the question whether or not teeth, manufactured according to the directions of the patent, laying out of view back plates or fastenings, is or is not a useful practical article. If it is, then the plaintiff, so far as this first claim is concerned, I think has sustained his patent. If, on the other hand, you come to the conclusion that without the intervention of the back straps and solder, teeth manufactured according to the description in the patent would be impracticable and useless, then I think the defence has been established.

In the next place, if the plaintiff fails upon the first ground,— that is upon the process for constructing the artifical teeth, then I think he fails upon the second claim, because it involves the inutility of the cement. If the plaintiff, in your judgment, has maintained the claim, on the constructiou I have given it, on the first ground, then I think he has on the second, because the first ground involves the utility of the cement, which is involved in the second claim.

The next question, supposing you shall come to the conclusion, on the evidence, that the patent is valid, will be whether or not the defendant has infringed.

Now, I agree with the counsel for the defendant, that if it appeared in this case that the defendant had purchased the cement of Allen, at one of the dental depots from a person licensed by the patentee, or his assignee, to sell the cement for the purpose of manufacturing teeth, that that of itself would be a defence, so far as it respects the second claim, which is simply for the compound or cement; I agree that a sale under the authority of the patentee would be an answer to that claim, because if he puts his cement upon sale, why any body who buys it is not responsible simply for the componnd. But in this case the weight of evidence seems to be that the article purchased and used by the defendant, in the manufacture of the teeth for Mrs. Davis, was an article on sale, manufactured from the formula of Dr Hunter, and therefore, though on sale by a person keeping one of the dental depots, yet he had no authority from the patentee or assignee to sell the article, therefore this ground of defence, I apprehend, is not available

The only question, it seems to me, involved in the point of infringement, is this: whether or not the formula of Dr. Hunter is or is not substantially the same as the formula of the patentee. If it is substantially different, then the use of it is not an infringement: if it is substantially the same, then it would be.

Now it is said that the formula of the patentee, taken strictly from the patent, would not produce, in process of manufacture, a substantial or useful article; and they argue further that the proportions have been changed, since the patent, by the patentee himself, and also by his assignees and agents, and that it is in consequence of this change of the proportions, this variation from the formula of the patent, that the party has obtained an article which is available for the purpose of making artificial teeth. Now all I mean to say to you upon this subject is this: I have said, and I repeat it, that you must be satisfied in the first place, that the formula, as found in the patent, is sufficient for the purpose of making a useful article, and if you come to that conclusion, then any unimportant variations, by way of difference in proportions, formal variations or changes in proportion, would be an evasion of the patent. The patent is not to be evaded in that way, by formal unimportant variations, by

changing the proportions; because some latitude may be indulged in this respect, without changing the original character of the article; and hence in that view these changes, unless radical, would not constitute a defence, although made in the formula of Dr. Hunter, used by the defendant.

But if you come to the conclusion that this change of proportion is essential for the purpose of making a useful article, and that without it a useful article cannot be made, then undoubtedly if that is the character of the change in the formula of Dr. Hunter, it would be outside of the other, would be a different article, and would not be an infringement.

These are all the observations I deem it necessary to make.—On the question of damages, if you come to that, the plaintiff only asks six cents.

A Juror: If we conclude from the evidence that Mr. Hunter uses and sells his compound by permission of Dr. Allen, would the defendant be guilty of infringement.

The Court: There is no evidence of that kind in the case.

Verdict for the defendant.

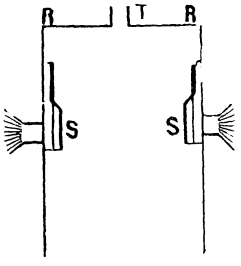
The engravings given herewith, together with the description accompanying them, were sent to us by Dr. Honsinger of Chicago, Ill. He requests that we should publish them for the benefit of his Dental brethren, and states that it is not "patented," neither is he engaged in manufacturing them, and that there can be but one opinion as to their utility, when the arrangement is understood. He styles it

HONSINGER'S COMBINED BLOW-PIPE AND LATHE.

"This machine is invaluable to the operator, and should be found in the laboratory of every dentist. It is so arranged that it may act either as a blow-pipe or a lathe. Its construction is as follows: the frame is of wood, and consists of a large air-chamber B. Below this is a smaller receiver, K, connected with the air-chamber by means of a small orifice. The receiver is in

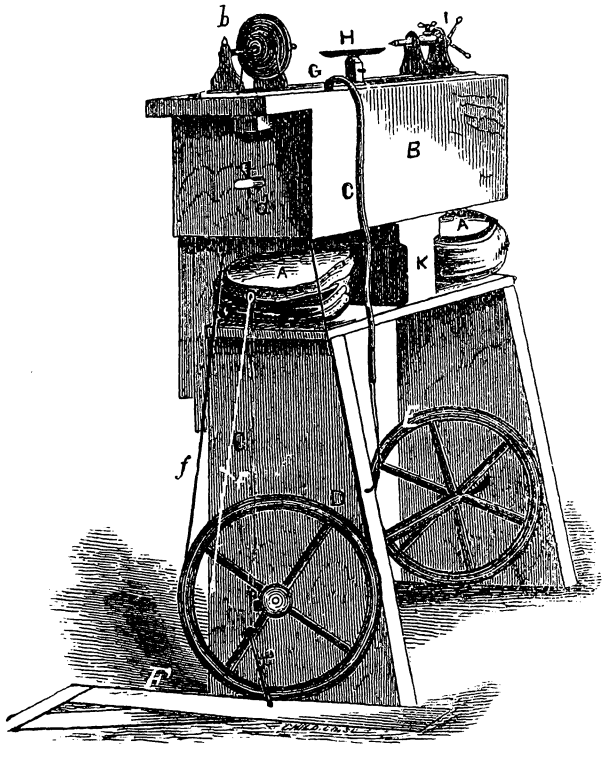
direct communication with the bellows, AA, which in turn are connected with the driving wheel, D, and the crank upon the opposite end of the shaft, by means of connecting rods, one of which is shown at C, and the other attached in a similar manner upon the other bellows; at *f*, is a bracket over which is thrown the connecting rod in order to avoid collision with the cranks, when running the lathe. E is a balance wheel used merely for balancing the shaft. F represents a common tread, attached to the driving wheel by means of a crank arrangement. From the top of the air chamber proceeds a small rubber tube, connected at the end with a blow-pipe.

Fig 2.



Upon the top of the air chamber is a common lathe.—At *d* is a stop cock used for regulating the quantity and force of air. The receiver K, is arranged upon the inside in the following manner:

Fig. 1.



Let RR represent the sides of the box into which the bellows enter. Directly in front of the noses are two valves SS, both opening inwardly. These valves are made of sheep skin, glued to the sides of the receiver above the opening, the clapper being formed of wood. The noses do not wholly enter the receiver, but pierce the board about half-way.

The working of the lathe is so simple and well known to every mechanic, that a lengthy description of it is unnecessary, the cord being attached to the pulley, *b*, and the driving wheel. When worked by the tread the crank makes an entire revolution.

Let us now suppose that we wish to work the blow-pipe. We attach the connectiug rods, one of which is represented at C, to the cranks of the driving wheel, leaving the cord which carries the lathe on or not as we please. As the friction is slight, and it saves the trouble of banding and disbanding, it may be left on.— The tread should then be worked lightly, so as to produce an oscillatory motion, which may bring the crank just beyond the centre at each turn. The cranks are reversed; that is, while one is up the other is down, thus causing one bellows to open while the other shuts. Suppose now that we are working the tread; one bellows opens and as it closes forces open the valve in front of it in the receiver, K, and shuts the other valve. The other bellows works in a similar manner, and thus the air in the receiver, K, by this constant oscillatory motion is forced through the orifice into the air chamber and thence through the opening, G, into the tube, C, issuing from the blow-pipe.

In working the tread, the crank should not make an entire revolution, but should be carried a little beyond the centre, as this movement will produce a sufficiently strong current of air. If at any time the force or quantity of air needs regulation, it may be done either by the extent of the oscilation or by the stop-cock. In the construction of this machine, it is necessary that every part of it should be air-tight. On this account, the ordinary sheep-skin bellows should not be used, as they will generally leak. This machine is invaluable to the operator, both on account of the ease of the operation and the saving of health. It is universally acknowledged that the use of the blow-pipe is injurious to the lungs, as indeed anything else which requires their constant use, thereby causing an undue strain. By this method all unhealthiness and weariness is avoided; at the same time the blast can be prolonged any desired time, and regulated with as much accuracy as by the mouth.

PHYSICAL CHARACTERISTICS OF THE TEETH.

BY T. L. K.

The variety of form and feature to be found in the human family has been universally remarked; it is a common saying that no two persons are alike—this is in a measure true, nevertheless there are distinguishing marks by the assistance of which we can frequently discover what are called family likenesses, and which often unfold themselves into what are called national characteristics; these peculiarities are as great or greater than the differences in language. They are not confined to feature, form, or color, but often extend to disposition and temperament.

Thus we have the phlegmatic German, the keen speculative American, the stoical Turk, and the volatile Frenchman. To render the difference still greater, these races are subject to what might be called their national diseases. The habits and customs of the people acting, probably, as a predisposing, and the peculiarities of country and climate as the exciting cause of such diseases.

The predisposition of a person to disease of any kind is influenced by, or, perhaps more properly speaking, co-exists with the temperament of that individual; it is well known that persons of certain temperament are subject to certain diseases or infirmities of mind or body, and unless by proper training these defects have been remedied or guarded against, they are sure to show themselves whenever they can obtain the assistance of what is termed in medical nomenclature, an exciting cause.

To give a dissertation upon the various diseases and misfortunes to which we are all more or less liable, is not my intention. I propose to confine my remarks merely to the morbid changes which have been noticed in, and which are peculiar to the dental organs, the causes and effects of such changes, the mode of treating them, and the probable durability and utility of operations usually performed in arresting certain of these diseases

For the more convenient disposition of the subject, I have concluded to arrange the different varieties or qualities of teeth met with by the dental practitioner under the heads of the different temperaments, referring each class to the particular temperament or diathesis with which it is usually accompanied. That the character of the teeth is influenced by the constitutional tendency of the individual, may to some appear strange, but, were they entirely exempt from such influence, I imagine it would be an anomaly in nature.

It is well known that the earthy portion of the teeth is deposited upon the pulps by the blood, and in proportion as the innate constitution be bad, so will the blood be deteriorated, as a natural consequence, therefore the utility and beauty of these organs must be affected in proportion. Most striking illustrations of this fact are frequently met with by the dental surgeon in persons having had originally weakly constitutions, but by the timely assistance of a skillfully administered regime and diet, have been enabled to overcome the difficulties they labored under during their infancy, and have eventually acquired constitutions if not perfect, at least good. The teeth of such persons will be found to differ greatly in color and density, those which commenced to ossify during infancy, or while the individual was suffering the ills attending an imperfect organization will be found to be imperfect in many respects, and to present a strong contrast with those formed after a good habit of body has been obtained.

Again, a child, although at birth perfectly healthy, may have its teeth seriously injured by improper diet and treatment. This can be easily accounted for, as the quality and quantity of the blood depends altogether upon the quality and quantity of the nourishment and the manner in which the organs whose function it is to secrete and prepare the blood perform their duties, it is impossible for these organs to make good blood out of improper material, and if the blood be deteriorated most certainly will the teeeth partake of its defects, for, as I remarked above, it is from the blood that the earthy portion of the teeth is taken, and as this is imperfect, so will these salts be furnished in less abundance and of inferior quality.

Another illustration of this may be met with in persons who having had originally strong constitutions, have during some period of their childhood been afflicted with violent disease of any kind; the teeth, which underwent the process of ossification at that time, will be found to be decidedly imperfect. They are generally of bad color, having a chalky appearance, perhaps tinged with blue, their surfaces are rough, and the enamel is apt to scale off. Teeth of this description rapidly decay, and frequently notwithstanding the efforts of the dentist and the greatest attention on the part of the patient, they are lost at an early age. The teeth that were ossified while the patient was in perfect health, will be found to differ from the others in a remarkable degree; their color, shape, size, and density being much superior, and these teeth may frequently be found doing good service years after the kind first mentioned have disappeared. So great is the difference between them, that a skillful dentist knowing the periods at which the different classes of teeth begin to ossify, can tell with a remarkable certainty the time when such a crisis occurred.

The teeth then are subject during their formation to the same influences as are the other organs, but with the addition of one unfortunate feature, namely—as they are at first formed so do they remain, with the exception of a slight increase of density as they grow older. Other parts of the human organization by proper curative measures may be much improved, but the only changes to which these organs are subject can but be for the worse, and for a large proportion of their diseases there is no cure. It is true the dentist can lend his assistance towards thwarting and even stopping the ravages of disease, and provided his operations have been properly performed, they will frequently be of essential benefit to the patient, but it is as impossible for him to rebuild, to re-construct diseased organs, as it is for the physician; the latter merely assists nature in her efforts to recover; to the former nature lends no helping hand even in the midst of her power, and when attacked by enemies the teeth are not only left to shift for themselves, but are endangered and often destroyed by the very means adopted by nature for her own recovery, and too frequently are those dangers increased by the so-called assistance of the medical practitioner.

1st Class.

In individuals of a sanguine temperament we have what has usually been considered as the first class of teeth, and I think very properly. In such persons we meet with strong, robust frames, and sound constitutions, their blood is of superior quality and in large quantity, and is rich in fibrin, it is from the red particles of the blood that the earthy salts are derived, and if we find the red globules in abundance and of good quality, the teeth must necessarily be hard, sound, and durable.

These teeth are usually of a yellow shade, are short, thick, edges square, are uniform in shape, and generally occupy their proper position in the dental arch. I say generally, the most common deviation, and I believe it is almost peculiar to this class, is that of the edges of the upper incisors directly antagonizing with those of the lower. Teeth of this class are not easily acted upon by corrosive agents, and if disease should unfortunately make its appearance upon them it makes but slow progress, and is easily and most effectually arrested by proper treatment.—The most important diseases to which they are subject, are caries and abrasion—the caries is usually black, makes slow progress, often exists for many years without causing pain or inconvenience, in fact, without being suspected, and is accompanied by a *very* slight softening of the structure of the teeth, so slight as almost to render unnecessary the usual

operations and treatment of the disease under other and less favorable circumstances. Operations performed upon these teeth are those above all others upon which the dentist can predict the most perfect success.

The kind of abrasion to which they are liable is known as mechanical abrasion, and as it is caused by the constant friction of the edges of the incisors cannot, I imagine, be properly called a disease ; of course, for this there is no cure, nor am I acquainted with any mode of treatment which can be called palliative.

Persons possessing this 1st class of teeth, are most commonly met with in cold or temperate climates, among the middle and lower classes of society, and more particularly in those who have from their infancy lived much in the open air.

2ND CLASS.

In persons possessing what may be called a lymphatic temperament, the watery portion of the blood is found to be in excess, and the red globules not only proportionally diminished, but frequently of poor quality. To substantiate my theory, the teeth of this class ought to be much less durable than those before mentioned. And what is the case? Observation has proved them to be exceedingly soft and liable to decay.—They are found to be delicate in shape, the incisors long, thin, and narrow, the centrals frequently a little longer than the laterals ; the cuspidati round, pointed ; bicuspids and molars with exceedingly prominent tubercles—upon the tubercles of the latter are to be seen numerous grooves running from their margins towards the centre of the grinding surface.

The sharp edges and delicately pointed tubercles of these teeth proves the ossific matter to have been deposited but sparingly from the first ; had there been a more ample supply the edges would have been less sharp, the tubercles less pointed, and the grooves upon the tubercles scarcely, if at all, visible.

Teeth of the second class are usually very sensitive, caused, doubtless, by their superabundance of animal matter, and, as I before remarked, are easily acted upon by corrosive agents. Unfortunately, the mucous secretions of persons possessing the lymphatic temperament are by very slight constitutional disorders apt to be rendered extremely viscid, and unless the greatest care and attention be paid to cleanliness, the teeth are apt to be attacked by a species of caries almost peculiar to this class, and the ravages of which it is difficult and sometimes impossible, to arrest. I allude to that disease known as white caries ; the parts attacked by it are rendered soft and humid, and as they retain their natural color,

it but too frequently happens that sufferers have no knowledge of their having been attacked by it until their teeth are almost irretrievably lost.

Individuals knowing the liability of their teeth to this disease, ought to pay great attention to their cleanliness, and have frequent recourse to the dentist, as an educated eye can do as much towards detecting its presence as a properly trained and skillfully directed hand can do towards arresting its progress.

There is a kind of atrophy frequently found upon these teeth, it is congenital, and is known by white or brown opaque spots, upon or rather immediately beneath the enamel, caused no doubt by the loss of the intermediary or connecting membrane, between the enamel and the dentine. There is of course no cure for this, but its presence is sufficient to warn the patient that if great care be not taken the beauty of their dentine will be destroyed, as it is usually found upon the outer surfaces of the anterior teeth and is invariably accompanied by a softening of the enamel.

The last distinct class of teeth that I shall bring under consideration is to be met with in the mouths of those who have inherited a scrofulous habit or diathesis. In this state of the system we find a sufficient supply of blood, but it is usually of a pernicious character. The whole organization is affected by and rendered peculiarly susceptible to disease, more particularly to that class of diseases superinduced by cold. To enter into a dissertation upon scrofula would be foreign to my purpose; I will merely remark that it most generally manifests itself at an early period, though it may remain apparently dormant for a number of years. When the latter is the case, it usually terminates in tubercular disease, in which case death by consumption is the common result. In most other cases it is made known by tumours and ulcers, situated upon various parts of the body, frequently in the neighborhood of the neck. Persons thus affected, usually have very delicate complexions, the upper lip shows a tendency to swell, at an early day the morbid growths upon the head and neck make their appearance. Teeth developed under constitutional defects of this nature are found to be of large size, of a dull yellow or brownish shade. Incisors frequently project forward.—These teeth are of an exceedingly soft texture and are more easily acted upon by external agents than either of the classes mentioned, a necessary result of the morbid condition of the fluid from which their earthy salts are derived. They are almost invariably lost at an early age. Sometimes no possible means can prevent their decay. Operations upon them may be performed in the most scientific manner and yet result in but little benefit to the patient, though often in serious injury to the reputation of

that operator, who through ignorance of the constitutional tendency of his patient, or perhaps in a spirit of empiricism or egotism may have confidently predicted the ultimate success of his operations.

The caries to which these teeth are liable is in color and consistency something between the two kinds previously mentioned, but its effects are much more severe. Teeth attacked by it exhale a fœtid odor, which no aroma or tooth wash can disguise, and the particles of which where in contact with the filaments from the first pair of nerves make an impression that will not soon allow the initiated to put themselves in the way of a second attack. The proper course to persue under these circumstances, is first, removal of decay; second, proper filling and then general constitutional treatment; to the first, we may look for a transient cessation of its ills, but to the latter all permanent relief must be indebted, and even all of these combined, the latter successfully so far as general symptons are concerned, may be of no avail, it is not improbable that the disease will return and the same results follow its course—another dentist is applied to, he goes through with the same treatment and with the same success. The patient despairs, and through the ignorance of one or two, discredit is thrown upon the whole profession, while if these operators had possessed but a slight knowledge of the facts of the case, and a little less confidence in their ability to cope successfully with insurmountable difficulties, they would have been spared the mortification of knowing that they are considered by their unfortunate patients as either fools or scoundrels, and that they are looked upon by their professional brethren with contempt.

Amylene as an Anaesthetic Agent.—On Saturday last Dr. Snow administered the vapour of amylene in four Surgical operations, at King's College Hospital. The amylene caused an entire absence of pain in all the cases, although the inhalation was not carried so far as to induce complete coma, the patients appearing to be in a dreaming state during the greater part of the time that the operations were going on. There was a little mental excitement and muscular rigidity in the two men, but not more than frequently takes place under the influence of chlo-

roform; and the recovery from the effects of the vapour was very prompt. Dr. Snow had previously given the amylene in several operations on the teeth, performed in the same hospital by Mr. Samuel Cartwright, the Dentist to the institution; and he informed us that he had not yet met with sickness in any case, although most of these latter patients had taken their dinners just before coming to have teeth extracted. Amylene is made by distilling fusel oil with chloride of zinc. Its composition is 10 atoms of carbon and 10 of hydrogen. It is only two-thirds as heavy as water, and it boils at 102° Fahr. The vapour is much less pungent than that of chloroform, and therefore easier to breathe.—This liquid was first described by Cahours about fifteen years ago, but has apparently not attracted much notice. We are not aware that it was ever applied by inhalation till Dr. Snow turned his attention to it a few weeks ago, and he is not prepared to say whether he will recommend it for general employment. The amylene he has used was made for him by Mr. Loyd Bullock. It was administered in all the above cases by means of his usual chloroform inhaler.—*Medical Times and Gazette, London.*

Dentistry in England.—Efforts are now making in London for the establishment of a Dental College or Institute. The scientific dentists, as well as physicians and surgeons there, are in favor of the plan, and not a few of them are looking to this country for guidance in the matter. A member of the Royal College of Surgeons, in a letter published in the *London Lancet*, says, that when on a visit lately to the United States, his conviction was that dentistry, as an art was much better understood and practised here than in that country, and recommends the Baltimore College of Dental Surgery as a model for the new English Institution.

EDITORIAL.

MURDER OF DR. BURDELL.

As the recent tragedy, which has so universally monopolized public attention, has had for its victim a well known member of our profession, a few remarks concerning the occurrence may not inappropriately accompany a short biographical sketch of the unfortunrte deceased.

Harvey Burdell was born in Herkimer village, N. Y., in the year 1811. At the age of 9 or 10 he removed with his father to Sackett's Harbor, where he probably received the greater part of his earlier education. After attending the Academy of the latter place several years, he entered a printing office in a neighboring town. This may be considered as the commencement of his career, as from this time he seems never to have been under any parental control, nor to have received any assistance from home. At this early age, (15 years) he frequently expressed his determination to make money, and seems to have always after entertained the most sanguine expectations of eventually becoming "rich." Application, industry, perseverance and an almost miserly economy appear to have been from this time his characteristics.

After remaining in the printing office two years he yeilded to the urgent solicitations of his brother, the late John Burdell, at that time a popular Dentist of this city, and came to New York, commenced studying and working in his brother's office, and also studied medicine in the office of a neighboring physician. After two years spent in this manner, he went to Philadelphia, entered one of the medical colleges, and upon graduating returned to this city and commenced dental practice, whcih he continued up to the time of his death, without having attained a reputation of high standard either in the eyes of the public or the profession. Dr. Burdell's practice probably never exceeded in gross amount more than $2,500 per annum, and for the bulk of this it is quite probable he was indebted to the widely extended reputation of his brother John.

It may seem strange that from a practice so meagre, so large an estate should be amassed, but the peculiar characteristics of the man must be borne in mind, together with the fact that he was literally "alone," no one being dependent upon him, no really intimate associates; usually sleeping in a room adjoining his office, and procuring his meals at restaurants. A naturally frank hearted disposition had been smothered or sacrificed by a morbid desire to grasp the almighty dollar. Friendship, the ties of kindred and affection, professional ambition, were thrown aside or crushed the instant they came into collision with any prospect of gain. All the true happiness of life he seems to have sacrificed, and to what end? Simply to amass a bribe sufficient to nerve his murderers to the execution of one of the most diabolical murders on record.

The occupants of Dr. Burdell's house at the time of his death, consisted of a Mrs. Cunningham, (who held a lease of the house from the Doctor,) her two daughters 18 and 20 years of age, two sons 9 and 10, an invited guest, Mr. Snodgrass, (18 years old,) who has been three months in the house, and a Mr. John J. Eckel, whose position has not yet appeared; one servant girl, and a lodger, Mr. Ullman, make up the rest of the household.

The body of Dr. Burdell was first discovered by his office boy when about entering the room with coal on the morning of the 29th of January. He had evidently been murdered sometime during the night previous. Fifteen wounds were found upon the body. One severing the carotid artery; two entering the heart, and five more, evidently aimed at the heart but not entering it.

From the evidence given before the Coroner, it appears that Dr. Burdell had frequently expressed his fears, that parties in the house were likely to do him some injury. To use his own words often repeated, "he was afraid of his life;" "That he had not even a safe place to keep his papers;" "Mrs. Cunningham had keys (and availed herself of them) that would open his doors, his drawers, and even his safe." A policeman had been called in to settle a quarrel between him and Mrs. C., originating in his having charged her with stealing some papers from his safe. Mrs. Cunningham had also sued him for breach of promise of marriage and seduction. They seem to have had repeated quarrels, and he had stated to friends that "Mrs. C. had threatened his life;" also that he would be awakened at night by some one opening the door, when Mrs. C. would enter, but finding him awake would immediately withdraw. He certainly must have been under serious apprehensions of danger during the week previous to his death, as a number of witnesses testify to his having made these apprehensions the subject of conversation, even while attending to matters of business. The afternoon previous to his death, he strongly urged his former partner to come and sleep with him nights as a means of ensuring his safety, and even obtained a promise that he would come that night if he could.

When Dr. B. left his office (half-past 4, P. M,,) he told the servant that if a tall gentleman (the partner alluded to above, probably) should call in the evening, to tell him to wait until he came in. When next seen, at about half past nine, he was leaving the cars at the corner of Bond Street and the Bowery, half a block from his residence. An hour later a person answering his description was noticed by a witness walking through Bond St. towards Broadway. The witness (Farrell) testifies that he was sitting on the steps in front of Dr. B.'s house, lacing his shoe; that the gentleman came up, opened the door with a night key and went in; that he heard his retreating steps upon the oil cloth as he left the door, a minute or two after he heard a smothered cry of murder, and after a very short interval the front door opened, a man with his coat and hat off came half-way out, asked him in a very rough tone "what he was doing there?" and ordered him to leave which he did at once, fearing the man was going to kick him. Farrell described the position of the man in his shirt sleeves as leaning his arm or hand against the door post, and holding the door partly open; his face, part of his body, and the arm against the door post in sight, the rest of his body was behind the door. Recognized Eckel as the man. Stains of blood were noticed the morning after the murder upon the door post at the spot indicated by the above, also blood upon the door handle. Another witness testifies to seeing a man upon the steps at the same hour, "doing

something with his shoe." "Saw a man in his shirt sleeves open the door and apparently order him off."

The other witnesses also heard the cry of murder at about the same time, thus fixing the time of its occurrence between half-past ten and eleven o'clock. The parties in the house all swear they knew nothing of the murder until it was made known by the office boy, nor did they know when Dr. B. came home. The cook testified: "That Mrs. Cunningham came down stairs and ordered her to bed at about 10 o'clock, an unusual occurrence, that the side lights at the front door had been closed for some nights previous to the murder, also by Mrs. C's order, although the cook said they were so small that a monkey could not get in; "heard no noise during the night; slept in 4th story; room door shut, also door shut at the foot of the stairs that led to the 4th story."

Mrs. Cunningham testified that she was Dr. Burdell's wife; married to him Oct. 28th, 1856; produced certficate of marriage, which seemed perfectly correct except the name, which was spelled Berdell, instead of Burdell; marriage was kept secret at Dr. B.'s request, who gave as a reason "that his friends would laugh at him and tease him;" was intended to be kept secret until July, when they would make it known and leave for Europe. When she ordered the cook to bed, Mr. Eckel was sitting in the back parlor in the dark; (the murder was committed in the room over the back parlor) afterwards Eckel went into her room where the rest of the family were congregated; all retired about eleven o'clock; knew nothing of the murder until after breakfast the next morning. Eckel and Mrs. Cunningham occupied the two front rooms upon the third floor communicating. The back room was occupied by Mr. Ullman; Dr. Burdell occupied the 2nd story; the rest of the family the fourth or attic floor. Snodgrass' testimony was equivocal and directly contradicted by other witnesses; knew nothing of the murder until after breakfast; never heard of the marriage before; never had bought a sword cane; did not take a bath before going to bed; went to bed about eleven; a witness subsequently testified to having sold him a sword cane a few days previous to the murder. A duplicate of the instrument was produced, it was handed to a physician who testified that it would make wounds like those found upon Dr. Burdell; tried it upon a dead body, also upon linen, the wounds were the same. One of Mrs. Cunningham's sons also testified that Snodgrass took a bath the night of the murder before going to bed.

The elder Miss Cunningham knew nothing of the murder—was present at the marriage; her mother and Dr. B. occupied the same apartments the night after the marriage and continued to do so until about a month ago, when her sister Helen was taken sick and her mother came up stairs and Helen slept with her, since which time one or the other of the sisters had slept with her mother in Mrs. C.'s apartments. Helen Cunningham knew nothing of the marriage, had not been sick during the past year; knew nothing of the murder. The boys also testified to hearing nothing unusual the night of the murder; knew nothing of the marriage.

The minister who gave the marriage certificate recognized Mrs. Cunningham as the lady he married; could not recognize Burdell; his servant who witnessed the ceremony gave similar testimony.

The suit for breach of promise it seems was discontinued on the 22d day of Oct., the alledged marriage took place upon the 28th day of the same month. The at-

torney who had charge of the suit told Mr. Chatfield about the middle or last of Nov., that Mrs. Cunningham had given orders to have it recommenced. This was sworn to by Mr. Chatfield and acknowlegded by Mrs. Cunningham's attorney Several witnesses testified to noticing in the neigborhood late at night or early in the morning, after the murder, a strong odor, as of burning cloth.

Eckel's clothing could not be found or accounted for, and as he had been for more than two months a resident in the house, this circumstance seems at least somewhat mysterious. Some of the testimony also indicates that Eckel and Mrs. Cunningham were particularly intimate, and all the family seem to have been unanimous in hating Dr. Burdell. We cannot of course fill up our pages with all the testimony given during the inquest, which continued to hold its sittings for over two weeks. We believe the few points mentioned above, comprise the most important developments thus far made public; and it becomes us all to bear in mind that the parties accused have not yet had opportunity for defence. Eckel and Mrs. Cunningham refused to testify when last brought before the Coroner.—The jury brought in a verdict of murder. Mr. Eckel and Mrs. Cunningham as principals—Snodgrass accessory, and all three are now in confinement awaiting the action of the Grand Jury. We omitted to mention that upon searching the house, Dr. Burdell's safe contained no papers of value. His will which was in his posession the day previous to his death, was, and still is, missing and some papers which he had stated they wanted to get from him were found in Eckel's secretary. The key of his safe was found among Mrs. Cunningham's drawers, also a revolver of Dr. Burdell's.

Mrs. Cunningham's attorney claimed for her, letters of administration upon the estate of deceased; the heirs also presented their claims. The estate has been put in the hands of the public administrator for the time being.

The whole affair is revolting. The state of affairs existing in the house previous to the murder, the brutal manner in which the murder was committed, the startling disclosures made during the inquest, and the manner in which the inquest was conducted, have combined in producing the most intense excitement, not only in the city but throughout the country. But alas! of the hundreds of thousands who have eagerly perused the details as they were made public, how few have bestowed a moments heed to the warning given. How few have permitted their thoughts to trace this crime back to its fountain head, there to find another proof that the "the love of money is the root of all evil."